

STAR AND  
WEATHER GOSSIP

JOSEPH H. ELGIE

UNIVERSITY OF TORONTO



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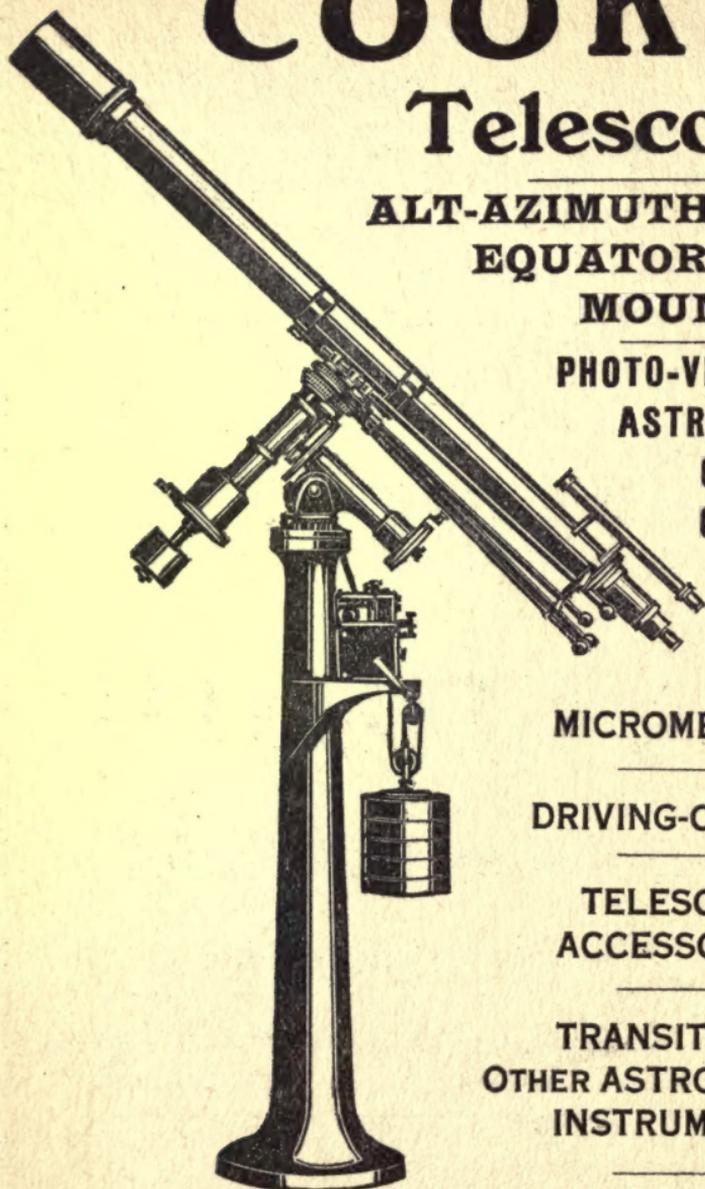
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**STAR AND WEATHER GOSSIP**

AND he wandered away and away  
With Nature, the dear old nurse,  
Who sang to him night and day  
The rhymes of the universe.

And whenever the way seemed long,  
Or his heart began to fail,  
She would sing a more wonderful song,  
Or tell a more marvellous tale.

LONGFELLOW.

Astron.  
E.

# Star & Weather Gossip

CONCERNING THE HEAVENS

THE ATMOSPHERE

THE SEA

BY

JOSEPH H. ELGIE, F.R.A.S., M.B.A.A.

AUTHOR OF "THE STARS NIGHT BY NIGHT"

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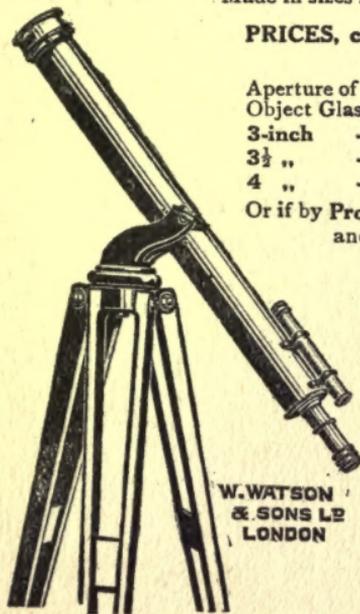
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# CONTENTS

CHAPTER	PAGE
I. WHEN THE NORTH SEA RAGES . . . . .	11
II. THE JULY SKY—THE REIGN OF VENUS—NORTHERN LIGHTS—THE MOREHOUSE COMET . . . . .	20
III. WINTER'S PASSING—A MID-MARCH NIGHT—A NOVEMBER FOG . . . . .	26
IV. SIRIUS — MARS THE MYSTERIOUS — TWINKLING PLANETS—WHEN WINTER COMES . . . . .	32
V. A WINTER OF CYCLONES . . . . .	39
VI. THE DAYLIGHT COMET'S DEPARTURE—HALLEY'S COMET . . . . .	48
VII. SUMMER . . . . .	55
VIII. GLOW-WORMS AND STARS—STARS WITH LOW ALTITUDES—A STAR-SPECTRE . . . . .	61
IX. CONCERNING TWO SUN-ECLIPSES—THE NIGHT-SKY IN FIJI . . . . .	68
X. THE HORIZON MOON—THE INVERTED MOON—THE MIDNIGHT SUN . . . . .	75
XI. WORK AT AN AMERICAN OBSERVATORY—MOON STUDY . . . . .	82
XII. STARS IN DAYLIGHT—PLANET NOTES . . . . .	92
XIII. ON SOME WEATHER PORTENTS . . . . .	101
XIV. CATS AND THE WEATHER—RAIN FROM THE SOUTH-EAST—RED SUNSETS—THUNDER AND LIGHTNING	110

CHAPTER	PAGE
XV. MISTAKES CONCERNING METEORS—STONE-FALLS FROM THE SKY—NOTES ON COMETS . . . . .	124
XVI. THE STORM'S TRIUMPH . . . . .	131
XVII. THE NAKED-EYE VISIBILITY OF JUPITER'S SATEL- LITES—GUN-FIRE AND RAIN . . . . .	142
XVIII. CAPELLA THE BEAUTIFUL—VARIABLES AND FAINT STARS—THE VOICES OF THE STARS—A FAMOUS AFRICAN JOURNEY . . . . .	151
XIX. THE PHANTOM PLANET—RICHTER'S DREAM—TELE- SCOPES AND TEMPERATURE—BRIGHTNESS OF MIDNIGHT SKY—CLOUDS AT SUNSET—THE MULTI- TUDINOUS STARS . . . . .	158
XX. SHAKESPEARE'S "SEVEN STARS"—MAY'S NIGHT- SKIES—THE JULY STARS—SUMMER SHOOTING- STARS—RAINBOWS . . . . .	167
XXI. ASTRONOMY IN THE ARCTIC—ORION'S BELT AND NEBULA—OF A MOON-ECLIPSE—A CLOUDY OC- CULTATION—NATURE AT REST . . . . .	175
INDEX . . . . .	187

## INTRODUCTION

IN this volume there will be found something concerning many aspects of Nature, from a summer afternoon by the Durham shore to tempest on the Atlantic; from the merciless rage of the North Sea to the peacefulness of a perfect autumn day; from the wonders of the starry skies to homely portents of the weather.

The material for most of the astronomical and purely weather subjects has been selected from contributions to *T.P.'s Weekly* and *The Yorkshire Weekly Post*. In the main, however, it is quite altered in form, sometimes only a few lines being retained out of a lengthy article in the original. I have introduced new matter wherever it seemed to tend to the better treatment of a particular subject.

The nautical sketches may interest those readers who are fond of the sea. For me, born almost on the cliff edge of the north-east coast, they have a warm corner in my heart. It is many years since the opening sketch, "When the North Sea Rages," was written. I submitted it to the judgment of the late Wm. Clark Russell, than whom no truer prose-poet of the sea ever breathed, and to my intense gratification he wrote in return: "Your description of the gale is full of the tumult of storm, and the oncoming of the wind is very well done." I am proud of that praise

to this day. I should be prouder still to feel that the readers of this narrative of the North Sea's fury endorsed Clark Russell's opinion.

On my first writing the story of the wreck of the French barque *Français*, here entitled "The Storm's Triumph," I sent it to the late Frank T. Bullen, whose nautical books are known the world over. His reply was characteristic of his kindly nature, for he wrote: "I felt I was reading my own stuff. You may or may not take that as a compliment, but it sums up the case as far as I am concerned. It also fires my admiration, for (tell it not in Gath) I *do* admire my own work after I see it in print, although I hate it while I am writing it."

At the close of the volume is a little sketch to which there is given the title of "Nature at Rest." This was first published in *The Newcastle Weekly Chronicle*, to whose able editor I am indebted for many kindnesses.

# STAR AND WEATHER GOSSIP

## CHAPTER I

### WHEN THE NORTH SEA RAGES

#### I

How gently, how insinuatingly, it came to our little north-eastern promontory ! A discoloured swell under a blue sky in the daytime ; a nightfall troubled with hollow draughts of air and sighing sounds, sounds that mingled weirdly with the dull rumour of the sea. That was all.

But the dwellers by the shore had misgivings ; the watchers at the dock-head were expectant. So, too, were the alertful coastguardsmen on their rounds ; they knew that the storm-cone had been hoisted on the weedy old jetty with the wooden beacon not many hours before. Yet from sheer force of habit—all being men of the sea—they kept glancing at the sky. And they observed that the stars did not twinkle that November night, but were steady, and dim, too, as the planets are in the warm haze of a summer's eve.

These men of the sea, skilled in the reading of weather signs, turned away thoughtfully ; the coastguardsmen on their watchful walk, the harbour-

master and the Customs boatman to their cheerful cabins.

The veteran lighthouse-keeper sauntered out on to his giddily perched balcony, night-glass in hand, cast a look alow and aloft, and muttered, "We'll git some dirt afore mornin', ah'm thinkin'."

Without doubt, there was an instinctive unquiet abroad on that bleak bit of sea-coast that night.

Yet there were but hollow draughts of air and sighing sounds, and the cliffs but re-echoed the languid splash of the muddy swell upon the black rocks.

Orion the Peerless was almost midway to the meridian, and the dazzling Dog Star hung over the edge of the sea, when a bank of cloud drifted athwart their radiance. The aerial forces of the storm were gathering for the fight.

List! was that languid splash of the muddy swell upon the black rocks deepening into a hollow boom? Did those sighing sounds of air bring a coldness to the heart? Or was it mere fancy, after all?

No, it was very real, for while the senses received these impressions the whole eastern sky grew heavy with scud and a blackness fell on the water. Then a snappish blast, with a sputter of rain, darted across the promontory. Down it rushed to the little harbour, making plaintive music as it soughed among the cluster of masts and sped onward to the grassy uplands—crowned by a white windmill—into the starlit void beyond.

Yet another blast, chillier and more snappish, I thought, than its predecessor. And yet another, and another. The breath of the storm was being felt. Already the water was agitated.

A rain-squall dashed itself upon the shore. The sea grew turbulent. And while the morning hours were still quite young the whole headland resounded with the clash of the elemental conflict.

Sleepers were awakened by the din ; windows were hastily barricaded ; those people who had risen from their beds feared to go back to them ; many folk had not dared to go to bed at all ; they had been possessed of an uncanny feeling that their roofs might be stripped off and their walls blown down upon them before they could escape.

As the night advanced the wind heightened. When dawn glimmered, unearthly-like, through the wilderness of murk the hurricane hailed it with the shriek of ten thousand furies.

The great salt wind blew dead inshore. It did not come gustily, but with a steady, mighty, roaring pour.

When a glimpse of the water was caught through the obscurity it was as though one looked on a snow-covered moor lashed into white chaos by a blizzard. The waves had no regularity, no rhythmic succession. Ere they could assume definite shape and sequence they were whipped into the air, torn into spray, blown ashore in perfectly horizontal lines, hurled against the face of the cliff and sent pouring over its edge like steam. The grim North Sea is terrible in its rage.

At the margin of the tide the foam lay knee-deep. With every run of the sea it floated, an undulating snow-field. Then while it was still buoyant the hurricane whisked it into a rapid vortex, drew it high upwards, and drove it over the town. By it the Moor had its carpet of green changed to quivering white. It was a lonely Moor that day.

## II

Noon saw the storm at its height. To be then at the sea-front was utterly bewildering. The senses were stunned by the terrible turmoil. The merciless might of the ocean beat down all feelings save that of an overpowering oppression. The heavens themselves seemed to have fallen on sea and land. The sun's light was lost. An awful shadow eclipsed the face of nature.

A few pilots and fishermen only stood braving the storm at the Heugh. Oilskinned and sou'westered, they huddled behind the lighthouse yard wall, on the New Pier side. They made an interesting group. While the lowering scud flew over their heads, and the sea-spray stung their faces and rattled on their oilskins, they tried to talk to one another. But shouting their loudest they made themselves heard with difficulty, and when the wind suddenly swept round the seaward end of their sheltering wall it clipped off their words with vicious abruptness.

Of course, their disjointed conversation was of wrecks and rescues. 'Tis ever so with these hardy fellows when tempest falls on the north-east coast. What more appropriate surroundings, indeed, could be conceived for recalling such stirring sea-tragedies as the loss of the French barque *Français* on Middleton Beach, a mile away; or the heartrending wreck, almost at their feet, of the *Rising Sun*, of Sunderland; or the heroic attempts to rescue the crew of the *Granite*, over the hurricane-swept bay yonder!

Starting from the northern side of the lighthouse was the great Headland Protection Wall, built to

preserve the crumbling cave-eaten cliffs from the onslaught of the sea. The storm played fearful havoc upon it. While the wind wrenched off the heads of the tall, substantial lamp-standards and shivered them to fragments, the waves snapped the thick, heavy iron stanchions on the edge of the wall, and even tore some of them from their bed of solid masonry.

At the New Pier—its construction is one of the memories of my boyhood—the mountainous masses of water made sport with the loose giant blocks of concrete. The North Sea storm-waves toy with mere tons.

Through the spray-mist I had wonderful glimpses of the raging sea attacking this long, massive break-water. As I stood in the wind, fascinated, the ground beneath my feet quaked with the perpetual impact between the forces of nature and the works of man. The great creamy breakers rushed out of the haze with a speed that would seem incredible to an inlander. Straight for the pier they went, and struck the high, smooth, curved wall with a noise that resembled the explosion of a huge shell. Then up, up they would shoot, eighty or a hundred feet into the air with the swiftness of a cannon-shot, and before they could descend again the wind would blow them into fine spray and sweep the mist with a seething hiss into the calm water beyond. Those waves—all chaotic—which were not thus dissipated, or which did not make a clean sweep of the pier, would rebound from the glistening wall and would meet another oncoming wave (perhaps a confusion of two or three of them) with a crash like violent overhead thunder. Such collisions invariably resulted in a tremendous upheaval

of water. As may be imagined, these contending seas, while adding to the general clamour, churned the water into foam, which above the tide at this part of the shore lay quite four feet deep.

## III

Away from the sea, down in the ancient town, desolation reigned. No vehicles were astir; the shops were closed and shuttered, to save the windows. The storm was in absolute and undisputed possession; its tumult penetrated every corner of the homes of the inhabitants, who, for the most part did not venture out to run the risk of being blown off their feet or injured by falling masonry. It was exceedingly dangerous being out in the streets at all that day. Slates were ripped from roofs and carried away on the wind like so many pieces of pasteboard, as I myself witnessed in various quarters of the town. The crash of a falling chimney-stack continually broke on the thunder of the gale. The shivering of glass was one of the common sounds of the day.

The main approach to the docks was deep in débris torn from the house-tops. Passing that way was a most hazardous proceeding. It was necessary to hug the inner side of the pavement and dart from doorway to doorway, taking breath and a glance aloft from every place of refuge. I saw several slates blown across the street to an opposite roof, and on one occasion a chimney-stack fell with an ear-splitting crash a few yards from where I was sheltering.

This thoroughfare led to the ferries, which for so many years have plied across to Middleton, but the

row-boats were suspended that day. It is only in the severest weather that they cease running. Even could they have been kept going there would have been no passengers to ferry over.

On the Town Wall, which skirts the narrow channel leading from the bay to the harbour, a small group of men stood leaning against the wind and gazing fixedly in the direction of West Hartlepool sands. What they saw through such a smother of spindrift I was at a loss to imagine. Suddenly, however, there was a slight clearance that way. The dim outline of a ship on the beach slowly revealed itself; then the spray-mist closed in again. . . .

So the destruction by land and sea went on, and at the roughest spot of all there rose, calm and serene, as though disdainful of Nature's fiercest assaults, the white, tapering tower of the lighthouse :

And as the evening darkens, lo ! how bright,  
Through the deep twilight of the purple air,  
Beams forth the sudden radiance of its light  
With strange, unearthly splendour in its glare !

#### IV

A tug heaved slowly into the little harbour at day-break on the following morning. The skipper told me that for twenty-six hours he had fought with the hurricane in the bay, almost within hailing distance of land. During the whole of that anxious time he was unable to see more than a few yards away, and could only keep steaming in the teeth of the wind and sea. His vessel moved in a circle, he believed. All around was the white, ghostly spindrift, and so precarious was their situation that not a single man

of them expected to set foot on shore again. He described the waves as the queerest he had ever experienced ; they spurted into the air twice the height of the funnel. How the men kept the fires going no one seemed to know clearly ; once they were quenched nothing could have saved the tug and her crew. Sea after sea flooded the stokehole, and all hands worked unceasingly to get the water passed up in buckets. When I went down into it the cinders were knee-deep.

One golden afternoon, when the bay had fallen as quiet as a lake, I saw a waterlogged Norwegian barque towed into port. Her main and mizzen masts had gone ; so, too, had her foretopmast. The jagged stumps of the missing masts protruded gauntly a few feet above the deck. A trawler had the vessel in tow, and as she passed through the lock I scrambled aboard of her. Her decks felt like pulp to the tread. Little of her bulwarks remained ; they had been carried away by the great seas, and also, no doubt by the falling spars. How she had kept afloat with her decks almost awash was a mystery until it transpired that she was timber-laden.

The deck-house, always so conspicuous a feature of Scandinavian timber ships, was left standing, but the doors had disappeared and the interior was stripped bare. A prison cell could not have been more uninviting than that skeleton of a deck-house. It was clear that the seas had played hide-and-seek in and out of it at will ; and while bursting continually over the crippled vessel, as over a log, they had made a clean sweep of the deck cargo, not a stick of which remained.

Those who were left of the crew were visibly affected.

Cowed by their terrible experience aboard this battered barque, they shuffled along the soddened decks wearily and with vacant stare, indifferent alike to kindly inquiries and to the fact that they had at last reached a haven of refuge. When the seas were running at their highest two of the sailors were swept overboard like a flash, and their dying shrieks were smothered by the louder shrieks of the hurricane. Another of the men had his leg broken. He lay helpless in the captain's cabin.

On board the trawler that brought her in a begrimed member of the crew told of how the barque, before they picked her up, had been in tow of another trawler, and how that one of the men of this latter vessel got fast in the bight of the warp and was cut in two, whereupon the barque was cast off to the mercy of the gale again.

But such harrowing incidents as these were many during that memorable storm. Yet how gently, and how insinuatingly, did it not come from over the ocean to the little promontory ! A discoloured swell under a blue sky in the daytime ; a nightfall troubled with hollow draughts of air and sighing sounds that mingled weirdly with the dull rumour of the sea. That was all.

## CHAPTER II

### THE JULY SKY

NINE o'clock ! A perfect mid-July night, warm and still, the air wonderfully transparent.

Over the north-west horizon, where the sun has set, there are violet-tinted clouds, which contrast prettily with the deep orange glow surrounding them. This sun-glow merges into the softest shade of pink, stretching cuneiformly half-way to the zenith. The orange and pink hues are bordered by a sky of delicate green, deepening overhead into a dark blue,

Vega glitters as a white point in the cloudless expanse of azure ; Arcturus is in the opposite quarter of the heavens, scintillating in solitude. They alone of the stars are visible at a glance this sweet July evening.

Night falls imperceptibly and Vega turns to a vivid green. From a neighbouring church the first quarter after nine is sounded. Antares has now flashed out low in the southern sky. Its light is more orange than red, but it will redden with the deepening darkness. Northward, the Pole Star is just discernible.

Nine-thirty ! The orange and violet and pink have faded from the north-west, and have given place to a pallid glow, in which not a star is visible. The zenithal blue deepens, and shadows and mists begin to creep over the quiet landscape.

As the night darkens, the head of Cygnus appears in the north-east ; Altair brightens, and Gamma Aquilæ, immediately above it, can be well seen. I can trace all the Plough stars except Megrez.

Other stars come out : Capella flashes spectrally in the northern glow as it passes under the Pole. The wings of night are fast being folded over the earth.

Ten-fifteen ! How beautiful is the night ! There is Cassiopeia opposite to the Plough ; just below are the curved stars of Perseus, above and to the right of Capella. Beta Aquilæ, under Altair, is now revealed, completing the three stars which are so often mistaken for the Belt of Orion. Altair is, of course, the brilliant centre star of the trio. Then between Aquila and the horizon I can detect some of the stars of Capricornus ; a few of the Sagittarius stars also can be seen.

Who can say that all the glorious night-skies belong to the winter season ? Summer has its beauties of the heavens, as it has its beauties of earth.

### THE REIGN OF VENUS

As leaden-eyed Saturn rules the night-sky, so does Venus now reign o' mornings ; hanging out her silver lamp to guide Aurora with the new-born day.

Yet heavy-footed was the Aurora she led up the sky's eastern slope one gusty morn last week, for in the semi-obscurity the horizon-rim was lost in darkling clouds ; clouds slashed with bars of amber that but intensified their gloominess.

Above, shone Venus, proudly radiant, as though defying earthly interference with her ancient mission.

Castor and Pollux glittered over her with becoming deference ; Procyon, twelve degrees away, gallantly paled ; the great Orion looked wan after his night's vigil ; Betelgeuse winked in an evil way his orange-red eye ; whilst Saturn, the unthroned, hastened to hide his heavy head in the dim, cloudy recesses of the south-west. Venus, and she alone, by long right and by virtue of her surpassing loveliness, was to usher in the day. Though she might have exercised her unquestioned authority just a little more pleasingly.

So harsh was the morning for early September. There was an end-of-October sharpness in the air ; troops of dun-coloured clouds with ominous fuzzy edges passed at the double over the sleeping city, and even round the far-distant south horizon the clouds could be distinctly seen gliding gloomily along like dark animated mountain ranges. An unlovely day to be ushered in by so lovely a planet.

Sirius, the brightest sun in the heavens next to our own, remained fast behind the cloudy screen. Mars himself was not more held captive by Otus and Ephialtes than was the Dog Star by these aerial barriers.

The mighty Mars in mortal fetters bound,  
 And lodged in brazen dungeons underground,  
 Full thirteen moons imprison'd roar'd in vain ;  
 Otus and Ephialtes held the chain :  
 Perhaps had perish'd had not Hermes' care  
 Restored the groaning god to upper air.

Still Venus had a charmed existence. The pertinacious clouds positively could not shut her out. At times she would be overwhelmed for a few moments, only to reappear as radiant as ever.

Five o'clock came vibrating through the air from citywards ; the stars paled before the coming day, or were obscured ; the morning brightened ; a bird, invisible to me, broke on the stillness between the gusts of wind with a sleepy, long-drawn-out " cheep " ; a crow swished past towards the south-west ; dogs began to bark ; lighter and lighter grew the sky—in gushes of light it seemed to me ; another day had come.

And Venus ? There she was, in an oasis of opalescent sky. She was beamless. The dazzling light of her silver lamp was extinguished. She had finished her task.

## NORTHERN LIGHTS

Warm and placid was the last night but one of September. Away from the city lights, where Nature brooded solemnly silent, a mystical glow suffused the northern horizon long after the sun had departed. Towards eight o'clock a clearly defined luminous arch could be seen stretching from N.E. to N.W., with its crown some fifteen degrees above the sky-line. It was like a star-surmounted silver portal that led to the region of eternal ice and snow.

Barely had I time to remark upon the beauty of the scene, when an auroral ray shot up over Arcturus in the north-west to level with Corona Borealis. It had no tint ; merely duskily luminous against the greater luminosity on which it was projected. Then other rays darted upward under the Great Bear, whose gigantic figure was feet down towards the horizon.

From due north the rays worked round to the nor'-nor'-east. One glowing, quivering shaft, indeed,

sprang up almost as far round eastward as Capella, which at that moment was blazing with great splendour. Simultaneously, a dazzling meteor flashed through Cygnus. This soundless display of heaven's wonders was impressive in the last degree. And its impressiveness was aided by the brilliance of the starlight.

Rising in the east, low enough to be dimmed by the vapours, were the Pleiades, with Capella and the attendant Kids almost level with them in the northeast, and the head of Aries to the south of them. These stars shone just above a silhouetted belt of distant elms, whose blackness contrasted markedly with the brightness and vivacity of the overhanging orbs.

Among the uppermost branches of some adjacent sycamores glowed the planet Saturn, as restful as the branches themselves. A few degrees above it was the Square of Pegasus. Overhead, in unsurpassed grandeur, stretched the mighty zone of the Milky Way, with Cygnus, Cassiopeia, Perseus and Lyra glittering upon it.

Shortly before nine o'clock a fan-shaped series of streamers appeared under the western side of Boötes and the tail of the Bear. One inexpressibly beautiful beam immersed Cor Caroli, which almost had its light extinguished.

For nearly an hour afterwards the northern sky remained quiescent. Yet there was still that fascinating, mystical glow. The display ended at five minutes past ten with a superb streamer which pierced Corona Borealis. It was but a momentary apparition, and when it faded from view the glow departed with it. The September night-sky became itself again.

## THE MOREHOUSE COMET

This famous object was discovered on September 1st, 1908, on three photographic plates simultaneously exposed by Mr. D. W. Morehouse, who, since 1902, has had charge of the Department of Astronomy and Physics at Drake University, Des Moines, Iowa. Mr. Morehouse has always been deeply interested in the application of photography to astronomy and in the use of the micrometer. He spent the summer of 1908 at Yerkes Observatory, working under Prof. Barnard's direction and using his instrument. In photographing the sky he gave special attention to long exposures, and his success in detecting the comet on the night of September 1st was the result of his giving a lengthened exposure in the hope of catching faint objects and nebulosity. These interesting facts he himself informs me of, as also does he details of what is notable about the comet. He was well justified in characterising the rapid change in the comet's appearance as a "notable thing," for the changes were remarkable. Indeed, people might have been heard asking where the tail of the poor little celestial visitor had gone. It apparently disappeared, and while we were all gazing sympathetically at the tailless object it suddenly developed another tail, as though it were the easiest thing in the world to produce such an offshoot at a moment's notice.

## CHAPTER III

### WINTER'S PASSING

ON a gloriously bright February day I sit down to give hail! to the returning sun.

I might be a lone traveller in a wilderness of eternal ice welcoming our luminary after the long winter night, such exceeding joy do I feel at the return of the genial solar beams. Filthy fog and foulest air, weeping skies and biting blasts, have held sway here sadly too long, no matter whether they be stern winter's prerogative or not. Too long has the beamless sun skulked behind any mean object whatever, be it a smoking chimney-stack or the outbuildings of an Inferno-like forge. Too long has even its place in the southern sky been undiscoverable for days together, as though it were utterly ashamed of its lowly position.

Yet we must not congratulate ourselves overmuch upon this portent of Spring. The February sun's capriciousness was recognised by Spenser, who deemed it worthy of mention in his immortal "Shepherd's Calendar":

When the shining sunne laugheth once,  
You deemen the spring is come attonce;

and just when you count "freed from feare," there

Comes the breme winter with chamfred browes,  
Full of wrinckles and frostie furrowes,  
Drerily shooting his stormy darte,  
Which cruddles the blood and pricks the harte.

And probably the sun has been an incorrigible in that respect ever since it rose upon the earth.

Since the warm, bright season it has travelled far, or, rather, the earth's orbital motion has made it appear to travel far among the stars. It has traversed Virgo, Libra, the upper and narrow part of Scorpio—between Beta Scorpium and Antares—crossed the Milky Way in Ophiuchus, and passed through Sagittarius into Capricornus, where it now is. Upon leaving Capricornus it has but to traverse Aquarius and a few degrees of Pisces, and then—oh! happy prospect—we shall have it north of the Equator again.

Poets oft sing of the winter sun's lengthening shadows. In my latitude the solar meridional height at the winter solstice is only about  $12\frac{1}{2}$  degrees, down to which it has sunk from about  $59\frac{1}{2}$  degrees, its meridional altitude at midsummer. And from midsummer, through the Autumn Equinox, onward to a few days before Christmas the shadows in our northern hemisphere lengthen.

But, joyful to relate, we have done with that for a season. To-day the meridian sun rose nearly nineteen degrees above my horizon, and has acquitted itself admirably. Hence my warm welcome.

## A MID-MARCH NIGHT

As dusk came on last evening, Sirius, not far to the eastward of the meridian, darted white fire so impetuously that a friend whose attention I drew to it laughed outright at what seemed to him the oddity of the spectacle. And I must admit that there was something diverting in its spitfire splendour.

I watched the star until shortly before seven, and saw only an occasional vivid red flash, which confirmed my previous observations that as the Dog Star nears the meridian its whiteness becomes more pronounced. The general behaviour of Sirius, which so amused my friend, may be explained by the uncommon state of the atmosphere, for snow showers had swept over my district the day long.

When night at length fell, the atmospheric transparency manifested itself in a brilliancy of the stars such as I have rarely witnessed in this country.

By eight o'clock, when the head of Aries was lowering in the west, its brightest stars, Alpha and Beta, were so lustrous as to momentarily lead me to mistake them for Castor and Pollux. Nor do I ever remember seeing the Hyades—at a later hour—so close to the horizon. What an expanded group it appeared! So near had it approached that it seemed to have penetrated the elevated sky-line with the point of its "V," and was being held in an upright position.

The Pleiades, on a level with the Hyades, and a few degrees to the right, shone quite undimmed by their lowly elevation. Capella, above them, was beautiful and brilliant, and so, also, was Arcturus, in the east. Even Spica, at no great height in the south-east, appeared large and luminous. The circumpolar stars, including Vega,—for that great sun never sets in my latitude—made the whole of the northern sky a celestial picture of the grandest magnificence.

Such was the transparent, star-filled sky of last evening. Then there was that sunset, too; those great masses of blue-black cloud hanging heavily over

the western horizon, barred with crimson and orange and pale yellow, with a yawning aperture showing a vista of purplish pink ending in clouded blue. Weather imports all, surely !

So to-day the morning broke in a snow-squall, and the afternoon fell entirely under stern Winter's sway.

And the icy cold of this mid-March day ! Truly 'twas a penalty to pay for an unclouded, star-blazing sky, and a sunset worthy of an ambitious painter's dream.

### A NOVEMBER FOG

The Fog Fiend's chilly breath has been breathed upon the desolate beach this early November morning.

At sunrise a light wind sprang out of the south, coming straight from the heathery moors of Yorkshire and across the crinkled waters of the Tees estuary, but it cannot dissipate this raw smother of vapour. As the choking stuff drives along,

Lengthening to th' horizon round,

it makes you cough and gasp with painful frequency, and deposits a thin film of salt upon your lips. Your general feeling is that of being enveloped in a sheet fresh dipped in the North Sea, whose waters, though almost by your side, are quite invisible. The low-circling sun

Sheds, weak and blunt, his wide refracted rays.

It is but a misty, suffused patch of orange light, perpetually changing its indefinite form as the steam-like clouds sweep steadily past.

A very Proteus is the sun this shivering November morning. At one moment it becomes so faintly nebulous as to convince you that the fog is intent on swallowing it up for the day ; at the next moment it reappears in determinate shape, looking down with blanched face upon the whitened world beneath.

Looming close at hand is a ghostly little lighthouse, and just as ghostly a little village, whose long sea front has an odd mixture of delightfully quaint cottages and very modern hotels and residences. It was gay with holiday-makers during the past summer, but the first blast of the October gales blew them back to their inland homes, and this morning it is left to the melancholy of the brooding mist.

The tide is out, and as you walk along the dimly gleaming beach there falls on your ear the mournful moan of the sea. At times, a deep-toned boom ! boom ! mingles solemnly with the sea's murmuring. Whence does it come ? Sounds are so difficult to locate on mornings such as these. There it is again, boom ! boom ! in dolorous, trembling cadences, as though it were the knell of some poor, drowned sailor.

Were you out in the bay, at the extreme limit of the dreaded Longscar Reef, you would see a large bell-buoy swinging sullenly with the motion of the swell. That is whence this intermittent tolling comes. During hard gales the buoy is sometimes torn from its moorings and cast ashore. I have seen it thus, a very bruised and battered semblance of its former self ; its sepulchral voice silenced. The mariners miss its voice, and on the Reef that lies out baywards, like a gigantic sea-monster stranded, disaster befalls them. There is a certain secluded corner in the churchyard of that

shadowy village yonder, and there we will let the rude monuments to the unknown shipwrecked tell their own sad tale.

When, along the deserted beach, you have walked northward less than half a mile from the village, you cross a stream which emerges from among the grass-patched dunes and the quiet fields beyond with a hoarse, impetuous roar. You are imagining it to be gliding over the broad stretch of sand in iridescent undulations, to lose itself in the sea, when through the fog there comes the weird screech of a siren sounded from a steamship in the bay.

Stare as you will in the direction of the sound, there is nothing visible but the fog, which stares blankly back at you.

Just when your eyes are beginning to ache with this gazing into white nothingness, the curtain slowly rises, first on the wet beach, next on the distant wavelets that lazily lap the shore, and then on the bay itself. The ship with the siren comes into view. You can vaguely make her out—a spectral ship upon a spectral sea.

The fog still lifts. An unreal-looking town is disclosed in the north-east ; a town, some do enviously say, of ancient and fish-like smell ; one with the tall tower of a venerable church named St. Hilda's as a bold landmark among clustering roofs ; a town for ever dear to me ; my native town, in fact.

To the southward, the looming heights of the North Yorkshire coast reveal themselves. Then the orange rays of the tardy sun shoot the little village and the glistening beach, and a fine November day lightens over land and sea.

## CHAPTER IV

### SIRIUS

WHEN April comes with its sweet showers and genial sunshine, the winter stars hasten to hide themselves in the ever-brightening west.

But, seemingly, not so Sirius. He shows a reluctance to quit the scene he has so brilliantly adorned on many a freezing night. Of course, he lags in vain; he will have to go with the rest of the winter starry host—with Orion, with the Pleiades and the Hyades, with Gemini, and with his faithful canine companion, the Lesser Dog. The last-mentioned, at this season of the year, always gives me the impression of being a fugitive from the attacks of the formidable Hydra, the Water Snake.

Then when Sirius and his co-adorners of the winter sky have been relegated to the rear of the celestial stage, or have quitted it altogether, enter the stars of Spring; enter Leo, Virgo, Boötes, Corona Borealis; enter Crater and Corvus, on the Water Snake's back. Enter, likewise, golden Arcturus, pale Regulus, blue-white Spica—stellar oases in the desert that follows the Garden of the Sky.

At nightfall, with April's opening, the Dog Star strikes prismatic fire in the sou'-sou'-west.

By ten o'clock he is near setting, and is almost level

with Orion's Belt, and with Procyon, the Lesser Dog, and Gemini hanging over him. In the deepening dusk—but why describe Sirius' position in detail? As superfluous must it surely be to tell of the Great Bear's place. One can no more mistake the Dog Star than can our kinsfolk in Cape Colony, or in Natal, or in Australia mistake their much-prized Southern Cross. Such blinding flashes of Sirian fire! So peerless an aspect! Why, with every coruscation, be it red; or green, or white, he autocratically announces: "I am the King of Suns, the brightest and most glorious orb in all this spacious firmament; even the mighty Canopus do I outshine." And did not his light resemble the approach of sunrise when he was about to appear in Herschel's great telescope?

## MARS THE MYSTERIOUS

What a grip on the imagination has the mystery of Mars! Especially is that true when the planet glows in the sky o' nights like some huge beacon on the top of a tall, distant mountain.

The more we learn about Mars the more mysterious does it become. Indeed, the entire universe is full of mysteries; it is itself one stupendous mystery. What, for instance, of the Milky Way? that "broad and ample road, whose dust is gold, and pavement stars," the Galaxy,

Which nightly as a circling zone thou seest  
Powder'd with stars.

What of the wandering comets? Of the asteroids,  
Eros-famed? Of the Zodiacal Light? Of the

Gegenschein ? Of those beautiful meteors which so attract us in April and August ?

But Mars ! Chiefest among celestial mysteries ; the very mystery of mysteries. There is in its solution a *human* interest, something quite outside the frigid, unsympathetic domain of purely abstract science.

Who, I wonder, will be the Œdipus to solve this Martian riddle ? Than the divine mathematical skill of Laplace, of Leverrier, of Adams, rather will he need the calm, well-balanced reasoning of a Newton, combined with the multi-vision of an Argus.

Yet we must admit that something is already known of Mars physically. In both our own country and America there is an earnest and assiduous band of students of the planet. But the palm for Martian research undeniably belongs to America, to Prof. Percival Lowell. With us in England the spirit is willing though the means be weak. The observers in the United States have the instruments and they are blessed with the skies. Here we are indifferently provided with both.

## TWINKLING PLANETS

What a merry sparkler is the planet Mercury ! Is there, indeed, anything quite so merry in the entire sky ? Yet planets are not generally supposed to twinkle at all. And one may say, broadly, that the supposition is true. Who has not always understood that a planet is to be distinguished from a "fixed star" by the steadiness of its beams ?

As a rule, the steadiness or unsteadiness of a planet's light depends upon the altitude of the body, as may

be proved by careful observation. How calm Jupiter is in the high heavens ! Could we see Mercury with the naked eye at an equal elevation it would be, no doubt, just as calm. This planet clings pretty closely to the sun, and is therefore seen with the unaided vision only low down through the greatest thickness of atmosphere, laden, not infrequently, with the grossest impurities, and of varying degrees of instability. Small wonder, then, that it scintillates so amazingly. In like manner, stars which rise to a great height become more subdued as they mount the sky—to grow livelier as they set.

Two planets may have the same altitude yet one sparkle more than the other. I have seen a twinkling Venus and a twinkling Jupiter, weird as such an assertion may sound ; and in every instance has Venus been the more vivacious. Jupiter has always been dignified even in his twinkle, so dignified, indeed, as to give a certain inappropriateness to the word—the frivolous word—*twinkle*. To a god of such high attributes one must not suggest undignified haste.

A twinkling Mars, too, have I seen, but only under special atmospheric conditions. My southern prospect lies over a great city, the air smoky, vapour-laden, gross in many respects, and when the planet is immersed in it all, nearing the horizon, it scintillates rapidly. An experienced observer viewing it under precisely the same conditions, once told me that he had mistaken Mars for its rival Antares, the two bodies being then in the same part of the sky.

Saturn, to the best of my recollection, I have never seen give the faintest flutter ; not even when in the horizon murk. It might be argued that so “leaden ” a planet should be the least likely of any to betray

even a suspicion of vivacity. But "leaden" as Saturn may appear, it is a flimsy enough body after all; perhaps no heavier than cork.

I have sometimes wondered if the twinkling of a planet is to any extent affected by the outer envelope of the body. Mercury, for all we know, has an exterior covering of dense cloud, and Mercury's light flickers with a truly bewildering rapidity. Venus, too, has a thick cloudy veil, and that planet, also, twinkles with great vigour, at times. Mars possesses a very rare atmosphere, and my observation shows me that it twinkles in but one particular position. Jupiter, of more or less gaseous constitution, throbs a little now and again, and Saturn, which seems to be largely gaseous, remains immobile. Yet the stars are gaseous, and they twinkle the more the lower they get. Of course, a star's point of light is more susceptible of atmospheric interference than is the visible disk of a planet.

Perhaps the *colour* of a planet is a factor to be considered in regard to scintillation. Colour seems to be of account where the stars are concerned. Then, I have often observed that a planet will twinkle the more vigorously, the more it is immersed in the sunlight, compatible, that is, with its visibility with the naked eye. Venus and Jupiter, for instance, have always appeared to me to be unsteadier when setting just after the sun or rising just before that body. The twilight or the dawn-light, indeed, would seem to have a singular effect upon the light of both stars and planets, such of them, at any rate, as are at a low, or fairly low altitude.

I have seen Sirius scintillating in the twilight as if it would leap out of the sky.

## WHEN WINTER COMES

What an arrant impostor Winter is! Here for weeks past have we been a-shivering with its varied inclemencies, and now does it come forward and coolly—oh, how coolly!—declare that it was but “making believe,” and that the *real* season, the Winter which is officially and astronomically Winter, only began on the Wednesday before Christmas, at eleven o’clock in the morning, if you please. Alas! the declaration is a true one; on that day the sun with us touched his lowest point; it was the day of the Winter Solstice. And being at his lowest point with us, he was, of course, at his highest with our South African kinsfolk.

Favoured South Africans! How you of Durban, of Cape Town, of Pietermaritzburg, of Port Elizabeth, of Pretoria must enjoy this Christmastide joke of us snowbound and fogbound Britishers at home! An Arctic scene of snow and ice and gloom outside, and the thermometer in my back garden registering eleven degrees of frost as I write! And the sun? Why, hours ago, his beamless coppery disk peeped over the ridge of the houses opposite, dodged quickly behind a chimney-stack, and disappeared for the rest of the day.

All this, too, through the wretched reversal of seasons whereby *our* sun sneaks in a shamefaced way—red with shame, indeed,—only some twelve to fourteen degrees above the fog-girt horizon, and *your* sun, ye Durbanites, rises to zenithal majesty a’most.

I cannot entertain a thought that the Durbanites could dream of envying us our fogs and snow and frost.

“How many degrees?” (This, if the reader will pardon the digression, to the Small Stargazer, who is examining the thermometer.) “Thirteen degrees of frost,” is the reply.

The sun's place in the heavens at the beginning of Winter, let me add, is in Sagittarius, the Archer, a sign considered by the old astrologers as lucky, which makes me believe that those occult gentlemen must have originated from South Africa. One of them, though—Arcandum by name—had but an odd notion of what luck was, in that a Sagittarius-born person was not only to be thrice wedded and to be very fond of vegetables, but he was to become a matchless tailor and to have three special illnesses. Well, to begin with, the blessings of triple matrimony are certainly a matter of opinion, neither do vegetables in bulk appeal to everyone; whilst as to the prospect of becoming even a matchless tailor and having three illnesses, even though they be special ones——.

## CHAPTER V

### A WINTER OF CYCLONES

#### I

WHEN, after that Atlantic voyage, Captain Snowdon, the veteran commander of the steamship *Wolviston*, safely brought his staunch vessel into Hartlepool, on March 18th, 1899, he declared that in the course of his fifty years' experience he had never encountered such fearful weather.

So remarkable, indeed, were the storms in the North Atlantic Ocean during two months of the winter of 1898-9 that a special Memoir relating to them was issued in the following year by the authority of the British Meteorological Council. Through the kindness of Dr. W. N. Shaw, the Director of the Meteorological Office, I have had ready access to this valuable Memoir, whilst the log of the *Wolviston* has been generously placed at my disposal by Messrs. Webster and Barraclough, of West Hartlepool, the owners of the vessel.

This log is as much a human document as it is a distinct contribution to meteorological science, in that it records in detail the *Wolviston's* experiences practically throughout that terrible series of cyclones, during which the *Wolviston* rescued the Cunard liner *Pavonia* in mid-Atlantic. The intense public interest which was aroused by the prolonged anxiety over the

safety of the *Pavonia* is specially referred to in the Meteorological Council's Memoir.

## II

The *Wolviston*, of 3770 tons burthen, left Tyne Dock for Baltimore, in ballast, on December 28th, 1898. On the evening of the next day Cape Wrath bore west-sou'-west, distant eleven miles. One of the first gales of the phenomenal series of that winter had just moderated; shipmasters variously described the seas which accompanied it as "mountainous," "tremendous," "terrific." Though the *Wolviston* fortunately escaped its full fury, she was not far out in the Atlantic before the wind again began to increase, and by nightfall of December 30th a strong gale was blowing with heavy beam seas. Labouring and straining a great deal, and shipping water fore and aft, she took a wave on board early next morning which broke four port glasses in the firemen's forecabin and one in the sailor's forecabin. Then, a few hours later, a great sea carried away the port lifeboat skid and broke the port glasses and frames in the engineers' berths. The weather moderated on the afternoon of January 2nd, but not before the *Wolviston's* fore-trysail sheet had carried away. Luckily, the sail was secured and re-set next morning, during, however, a succession of rain-squalls and the shipping of vast quantities of water. This gale was encountered by the steamship *St. Simon* in 47 degrees N. and 19 degrees W. Her captain reported waves of from 45 to 52 feet in height. The steamship *Parkman* was disabled on the same day in 50 degrees N. and 34 degrees W. The s.s. *Waesland*

was damaged, and the cargo of the *Maori* shifted while she was making for the English Channel.

On the morning of January 7th, when the *Wolviston* was rolling and pitching a great deal, her fore and main staysails were blown away, and the fore-trysail split. The log records on the morning following: "Mountainous seas; shipped great wave which broke the engineers' ventilator off, flooding the berths, breaking cabin mess-room funnel flange from the deck and carrying away starboard lifeboat skid, as well as breaking port glasses and frame in third engineer's berth and mess-room." The weather continued tempestuous, and on Monday, January 9th, a heavy sea washed away the ballast from the awning deck, destroyed four hatch tarpaulins and smashed all the boarding put up to protect the crew from the waves, which were constantly washing over the ship. Among other damage done by this sea was the bending of rails and stays, and the breaking of an iron stanchion with rails attached. The *Wolviston* that night was in 45 degrees N. and 31 degrees W. The storm at that time is described in the log as "terrific." From then up to the sighting of the American coast, every page of the log is filled with entries eloquent of the extraordinarily severe weather the vessel continued to encounter. One can conceive the intense relief of all on board when on Monday, January 23rd, the *Wolviston* got Cape Charles abeam, at the entrance to the Chesapeake. She reached Baltimore at 8.30 next morning.

Such was the *Wolviston's* outward passage. Her return passage was destined to be an even more eventful one.

## III

It was on January 31st that the *Wolviston* left Baltimore for Copenhagen. Meanwhile, a fierce storm had been raging out in the Atlantic. The *Pavonia* met it on January 30th, while going westward, in 45½ degrees N., 39 degrees W., and according to the Meteorological Council's Memoir, "At 9.40 p.m. on that day the wind increased to a hurricane with terrific squalls and the vessel lost steerage way. In the dangerous sea that was running the machinery was disabled at 7.0 the next morning, and at 8.30 a sea swept her decks and washed away the boats, doing at the same time other and extensive damage." The steamship *Rossmore*, battling with this hurricane in about 47 degrees N., 38 degrees W., met with a fearful sea and sprang a leak. The *Bulgaria* had her rudder broken and took a heavy list to port, whilst the *Quernmore*, in 41 degrees N., 46 W., found the air so charged with spindrift as to give the appearance of a heavy snowstorm. Dr. Vaughan Cornish believes there is strong ground for thinking that the swell from the hurricane reached Branksome Chine, between Bournemouth and Poole Haven, on February 1st, after travelling a distance of nearly 2,000 statute miles.

The *Wolviston*, on February 4th, was overtaken by a storm which created fearfully high and irregular seas, causing her to roll and pitch terribly and her decks to be constantly flooded. Then on Friday, February 10th, there arrived the great event of her eventful voyage. The log, at 11.45 a.m. on that day, records :

Sighted steamer flying signals of distress. Bore down on her.

A strong swell was running at the time. What followed may best be told by the log :

1 p.m. Came up to steamer; rounded to under her stern. She proved to be the s.s. *Pavonia*, of and from Liverpool, bound to Boston (America) with general cargo and passengers. They hailed us from the *Pavonia* and asked our captain if he could tow them to St. Miguel's. Our captain then went below to see his charter party, and after seeing the engineer about the coal, came on deck again and said he would endeavour to tow them, weather permitting. With that, a ringing cheer was sent up by the passengers again and again; the passengers in the interval with clasped hands had been gesticulating for us to tow them. . . . We hauled the hawser on board and got two turns round our mainmast and the end taken along to the bitts and secured. By this time the wind and sea were fast getting up.

3.55 p.m. Began towing. When the chief officer of the *Pavonia* was on board (he came with the lifeboat), he was asked what was the matter and said that the boilers were displaced, but the vessel was not making water.

#### IV

During the remainder of that afternoon and evening the wind and sea continued to make. Soon, the *Wolviston* was being washed over all. At 10.45 p.m., the log book says :

Ships taking opposite sheers, the tow rope parted ; stood by ship all night ; very strong wind and heavy sea.

At one o'clock next morning the *Wolviston* was "keeping steamer in sight" ; the wind was strong, with a nasty swell, and water was being shipped over all. Between sunrise and sunset of that day (Saturday, February 11th) the entries read :

At daylight, bore away towards steamer and went as close to him as prudent. Boat came from *Pavonia* with chief officer, who came on board. . . . Steamer signalled for us to wait, hoping for fine weather. Moved towards steamer. Weather too severe to attempt towing. Standing by steamer (2.0 p.m.) ; strong gale ; nasty sea washing over all. Steamer signalled "Do not desert us." Went close to steamer again, then placed ship's head to wind and sea.

10.0 p.m. Lost sight of steamer's lights.

Midnight. A severe gale continues to blow. Oil bags towed over side keeping seas from breaking.

Sunday, the 12th, saw the mid-Atlantic swept by another hurricane, and the *Wolviston* had a terrible experience, as the following log entries show :

4.0 a.m. Hard gale ; hove to.

5.0 Blew main trysail clean out of the rope.

6.0 Shipped tremendous sea, which washed away hencoop and broke stanchion and rails from against mainmast ; washed tarpaulin from No. 4 hatch and stove port boat.

9.0 Shipped another very heavy sea, which broke wheel-house window, laid rails down

- on port side of upper bridge, carried weather cloth away, also lid of polaris, with telescope, pointer and shadow-pen attached, as well as doing other damage.
- 1.15 p.m. Wore ship round, using oil bags and dripping oil; shaped course S.E. by E.; sharp look-out kept at mast-head for steamer's lights.
- 4.0 Tremendous sea running; still keeping oil bags towing. Very severe storm.
- 6.45 Sighted a bright light on starboard bow; kept steamer away towards it. Showed blue light from mast-head.
- 8.0 Blue light going up from steamer; answered by rocket.
- 9.0 Coming up to steamer.
- 9.15 Passed by steamer. Blew whistle, they answering by signal lights.
- 11.0 Bore towards *Pavonia* again.
- Midnight. Strong gale continues.

There was no improvement in the weather on the 13th. The *Pavonia* drifted all day before the storm, while the *Wolviston* kept in close touch with her. During the dark hours of that morning the seas were making a clean sweep over both vessels. On several occasions after daybreak the *Wolviston* steamed round the *Pavonia* and signals were exchanged between the vessels. The purport of these was that the ships were in latitude 40-10 N., and longitude 37-02 W.; that the *Pavonia* had 54 passengers on board, and that it was not intended to abandon the *Pavonia*, which had 25 days' provisions. The wind on that day was N.N.W., and the barometer at noon stood at 29.85. The day closed with a "very hard gale; tremendous

seas," and with the *Wolviston* hove to, to windward of the *Pavonia*.

## v

Tuesday, the 14th, opened with a moderate wind from the north and a very heavy swell, with the barometer standing at 30.40. The vessels had again been separated during the night, and at three o'clock in the morning the *Wolviston* regained her position to windward of the *Pavonia*. At daylight the *Pavonia* was once more taken in tow, heading S.E. by E. by compass. The barometer had risen at midnight to 30.42, with the breeze fresh, the swell strong and the atmosphere clear. At noon on the following day the barometer had dropped considerably, and the *Pavonia* was "sheering about badly." By daylight next morning there was a strong wind from the N.W. and heavy sea, and pine oil had to be dripped from the *Wolviston* to keep the waves from breaking on board. Nightfall brought an increase of both wind and sea, and the *Pavonia* continued to sheer about. Then on Friday, the 17th, how pleasant it is to read in the log—and how much more pleasant must the actual experience have been to all those on the vessels :

- 4.0 a.m. Light wind from N.N.W. ; steamer towing steadily.
- 9.0 Pico Island abeam.
- 4.0 p.m. Light breeze, fine and clear ; *Pavonia* towing steadily.

Also, Saturday, the 18th of February :

- 2.0 a.m. Fine weather ; strong deep swell ; light breeze.
- 4.0 Light breeze ; sea smoothing ; fine and clear.

- 5.15 Sighted St. Michael's (the Azores), bearing about E.N.E. by compass, distant about 15 miles.
- 11.0 a.m. Both ships safely at anchor; passengers and crew of *Pavonia* cheered again and again.

### VI

The *Wolviston* subsequently proceeded on her passage to Copenhagen. From there she returned to Hartlepool, where Captain Snowdon and his men were given a deservedly cordial reception. The *Pavonia* was towed home from the Azores by two Liverpool tugs. She reached the Mersey on the morning of March 11th and was the object of a remarkable demonstration. Her battered condition was evidence enough of the terrible nature of the weather she had experienced. Many pathetic scenes were witnessed when the members of her crew got ashore, for her escape in those mid-Atlantic hurricanes had been undoubtedly a narrow one, and in itself was eloquent testimony to her staunchness.

May I add that a sum of £5000 was awarded by the court for the *Wolviston's* services to the *Pavonia*, of which £3750 went to the owners, £416 to the captain, and £834 to the crew of the *Wolviston*, according to their rating. Further, that the Cunard Company's Board of Directors formally expressed their high appreciation of the resolution and good seamanship shown by Captain Snowdon "under very difficult circumstances."

These events as a whole should live in maritime annals with that certitude with which the winter of cyclones will live in the annals of meteorology.

## CHAPTER VI

### THE DAYLIGHT COMET'S DEPARTURE

COMETS may come and comets may go, but the weather is always with us. And what more tantalising than its vagaries just at a time when those vagaries are spoiling an historic sky-picture! For here were we warmly congratulating ourselves upon our nocturnal view of the great Daylight Comet, when lo! down upon the North Countree there swooped a succession of snow-blizzards the like of which we had not experienced for long enough. The comet went from our ken with those wild and whirling flakes, and ever since have the skies at sunset lowered sullenly.

When I last saw the comet—not many hours before the great snowstorm set in and lightnings flashed in the morning darkness—it had lost some of its brilliance. From an object most imposing it had become spectral, wan, as though its light were shining through a veil of mist. Its nucleus, too, had shrunk, and from resembling a dulled Mars at opposition it had dwindled to a vapour-immersed Betelgeuse or Aldebaran.

Clearly this big South-African-discovered comet (first seen in broad daylight) was in its decline, and perhaps, after all, it was a mercy that the blizzards blotted it out from the sight of those who had known it in better times.

But did ever comet create such a diversion! To turn the minds of men from the political plea of Codlin not Short were surely no easy task. Yet such a feat it successfully accomplished, and who knows, had it been visible later in the evening, that it would not have gone far to rob protesting candidates of their nightly audiences?

Then who can ever forget the humours of its visitation? There was, indeed, a delightful homeliness of wit about that culinary comparison which made the comet "the size of a plate." Then, who, too, but relished the "yards" and "feet" in which the length of the tail was expressed—though in Dante's day they *did* make the sun one foot in apparent diameter, and though Marco Polo *did* measure the altitude of the North Star and the Great Bear in fathoms. But the serious attempts to prove that the comet was *not* responsible for those very deplorable floods in Paris and for the snowstorm in the north——.

Even the provision of a celestial comedy of errors was not beyond the scope of this amazing object. The receiver of the telephonic message which announced the discovery misheard "Drake" for "great" and thus originated the title of "Drake's Comet." Of course, there was much wondering in the scientific world as to the identity of the mysterious "Mr. Drake," and as nothing more was heard from him—from South Africa—it was concluded that he was not only a marvel of mysteriousness but a monument of modesty as well.

The situation was all the more inexplicable in that "Mr. Drake" was supposed to be a Johannesburger.

When, however, it became known that the imper-

sonal, but important word "great" had to be substituted for that of "Drake," it was necessary to furnish the comet with a fresh title. The general public styled it variously Halley's Comet, the Daylight Comet, the New Comet, or the Miner's Comet. Some, indeed, with a fine sense of distinction, as well as with uncommon daring, alluded to it as the "Twilight Comet." And the worst of it was there was no gain-saying their pedantic assertion, for though the comet was a daylight one in South Africa it was a twilight one to us in England. That much I can personally vouch for, as my first view of it was on January 21st, 1910, soon after five o'clock in the evening, in a twilight almost as strong as the light of broad day.

All of these things left Science unmoved; Science had already determined that the comet should pass into astronomic history bearing the bald and unconvincing cognomen of "1910 *a*." For my part, I know it only as the Daylight Comet, just as I know Halley's and Donati's, and modest little Encke's, and that Proteus of the cometary world, Morehouse's. If anyone asked me whether Encke's was *a* or *z*, or whether Morehouse's was *n* or *m*, I could not for the life of me tell him.

## HALLEY'S COMET

### I

In one of old Thomas Dekker's plays I recently chanced on these opening lines spoken by Gasparo Trebazzi, Duke of Milan :

Behold ! Yon comet shows his head again.  
Twice hath he thus at cross-turns thrown on us  
Prodigious looks ; twice hath he troubled  
The waters of our eyes.

It is more than three centuries since Dekker put that superstitious speech into the Duke's mouth. Yet, bless me! what do I read as having occurred within these few weeks past? Why, this:

A neurotic man at Valencia had done nothing but think about a probable collision between Halley's comet and the earth since the comet's appearance. He became obsessed by the idea that this catastrophe would happen on February 19. He decided to escape from the world's collapse by jumping from a bedroom window. He fell on his head and crushed his skull.

Unhappy neurotic of Valencia! Had he but known that the "catastrophe" was not to happen until May 19th he could have enjoyed a three months' respite from an undignified death. To that extent this nervous subject of the King of Spain died prematurely.

One must suppose that the Valencia victim's fears sprang from some distorted view of the conjecture that on May 19th, 1910, our earth would pass through the tail of this renowned comet of Halley's. In his alarm he had magnified this innocuous terrestrial traverse into a catastrophic "collision." Innocuous traverse, in truth, for not the least harm either to us or to the old globe on which we dwell was likely to ensue. The pity on't that the ignorant should persist in their superstitious fears, setting the knowledge of the learned in such matters at defiance, and fostering in their timid breasts a demon which must surely destroy them.

With comets of great size, it is distance that lends

terror to the view. When they are millions of miles away from us we see them in a compact form, stretching sometimes through many degrees of the heavens. But let us become immersed in the tail-matter, and lo ! we are unconscious of the comet's very existence, so tenuous, so ethereal is that tail-matter. It would give us no " bump " ; it would not obstruct even the light of a star so faint as to require optical aid to render it visible to the eye. Its rarefied gases, indeed, would not probably reach the surface of the earth at all, protected as we are by a thick atmospheric envelope. The outer portions of our atmosphere, however, might have certain of its elements renewed by the earth's passage through the tail of such a large comet as Halley's, or Donati's, but that does not seem to me to be sufficient justification for a person taking so anticipatory and irreparable a step as that taken by the neurotic man of Valencia.

## II

What else was it but a cometary ghost that drew all eyes to the luminous west those pleasant evenings of May ! What but the ghost of Halley's Comet revisiting after three-quarters of a century the pale glimpses of our twilight skies of Spring ! And a shy ghost it was at that. Perhaps it realised having made its nocturnal appearance prematurely, and wished to withdraw until a more timely season.

In truth did we get the shadow when we expected the substance, and even the shadow was disappointing. The very ghost of " Halley's " was in its decadence. It made one wonder if, in the event of a return, it

would rise to the dignity of a naked-eye object. And to think that the flamboyant original affrighted nations !

My first view of this truly pathetic body was on the evening of Sunday, May 22nd, 1910. When I pointed it out to some friends thus : " There you see the celebrated Halley's Comet, which for more than two thousand years has been wheeling about the sun, and which——" my remarks were unceremoniously cut short by the entire party declaring that they refused to believe it. On my assuring them that it was so, the look of disappointment was general, and thenceforward none but myself found further interest in the insignificant, elusive, nebulous smudge which masqueraded under the guise of the great " Halley's."

Next evening, when the sun-glow had become subdued, out again timidly came the comet-phantom, and hundreds of watchers in my vicinity saw it and disbelieved. Neither would they be comforted. As the evening went on, these watchers grew not merely discouraged, but undisguisedly disgusted. Their desire by that time was not so much to see a magnificent comet as to meet those people who had so airily promised them one.

### III

After an inglorious apparition " Halley's " returned to that state of opera-glass visibility from which many of us thought it might as well never have emerged.

It was evident on Thursday, May 26th, that the comet was rapidly fading from view. On the following evening I found it a difficult naked-eye object, and by Sunday, May 29th, it was grown so faint as to be picked

up only with optical aid, though when once detected it could be made out as a very dim object without the glass. That evening's sky, scoured as it had been by squalls during the day, was, I think, a fair test of the comet's visibility, by which it would seem that the decline in "brightness" with us was more rapid than was anticipated.

In South Africa, they were more fortunate. Among the communications sent to impress that fact upon me was one from Mr. J. Holborow, of Mount Frere, Griqualand East, Cape Colony, who was convinced that if I could be so enthusiastic over the heavens in my "smoky atmosphere," I would have been enraptured with the truly superb spectacle afforded by the comet, fairly low down on the horizon, Venus a little higher, and the moon above all, in an absolutely cloudless sky. "The combined light was so brilliant that reading a newspaper was quite easy, and a range of mountains to the north stood out so boldly that kloofs and patches of forest could be seen quite distinctly, fourteen miles away, and the sky line for many miles farther." My brother, Mr. S. K. Elgie, of Durban, drew for my edification an enormous object, full, however, of eloquence of what an imposing sight "Halley's" must have been to the Natalians.

It is clear that we Northerners were most shamefully robbed of the spectacle by the horizon haze and the twilight, which conspired to obliterate just that part of the comet which would have lent impressiveness to the view.

## CHAPTER VII

### SUMMER

#### I

SUMMER is come ! Hail ! sweetest of seasons ; the only season, indeed, in which one can be truly said to live. For what is the east-wind-ridden Spring ? the low-toned Autumn ? the nerve-shattering Winter ? What is each of them but a period of slow-torturing transition from a seasonal earth to a like heaven. What but a kind of elemental interregnum filled with a vague sense of all seasons save Summer being but so many cheats of the joys of Summer itself.

Are not Spring, Autumn, and Winter mere shameless interlopers in our lives ? They ought not to count. Summer only should count. It alone is worth counting.

Thus can we be said to have lived but one-fourth of our lives, as inexorable Time compels us to reckon them. The old are young again in actual living. Any season which is not Summer is dead to me.

Yet the Summer begins to die from the moment of its birth. It arrived on Wednesday morning last, but yesterday saw the sun lower in the sky than it was the day before, and to-day we see it lower than it was yesterday.

With what joy must the envious Natalians and Cape Colonists view this solstitial retreat from the

regions of the north ; for the sun, as Coleridge sang of sleep, is beloved from pole to pole. Who but must appreciate Logan's praiseful hymn to the sun :

When tempests with their train impend on high,  
 Darken the day, and load the labouring sky ;  
 When heaven's wide convex glows with lightnings dire,  
 All ether flaming, and all earth on fire ;  
 When loud and long the deep-mouth'd thunder rolls,  
 And peals on peals redoubled rend the poles ;  
 If from the opening clouds thy form appears,  
 Her wonted charms the face of Nature wears ;  
 Thy beauteous orb restores departed day,  
 Looks from the sky and laughs the storm away.

Yes ! we are all sun-worshippers at heart, if we did but know it.

## II

In leafy, odoriferous June the stars reveal themselves reluctantly. One could fancy, indeed, that they were disinclined to divert attention from the manifold beauties of earth, for Nature has now dressed hill and wood, vale and meadow in fascinating finery, and we readily turn to feast our eyes upon it all.

It is only when we have continued our evening walks to a late hour—when the

Song of birds, and stir of leaves and wings

have long since died away—that the stars come to be of our company, but shy company at best ; the roses are more sociable by far.

A *nightless* month, in fact, is June, a month of northern glows, when the sun seems loth to leave the fair prospect on which it has shone the day through.

But June brings the summer, and the summer brings life.

## III

From the south end of Seaton Carew to the North Gare Breakwater, at the mouth of the river Tees, there runs an irregular rampart of low sandhills, terminating inshore in a sloping, rich carpet of fine grass. At the village end of the dunes seats are placed, on one of which I rest this early summer afternoon. The breeze comes laden with the scent of the sea and of the white clover that spreads itself between me and the beach. There are wisps of wind-blown vapour in the gentian-blue sky overhead. Gossamer cloudlets repose behind a diaphanous curtain of pearly haze out towards the sea's rim. A lark trills an appreciative song not far away. The droning of a bee is wafted from the clover. It is indeed an inspiring afternoon, when one feels to the full the joyousness of life.

Out in the bay the fishing-boats are dancing among the "white horses" without regard to measure. From Hartlepool there emerges a tug with a string of small craft, which it rapidly tows through the bay. The vessels curtsey to the dancing fishing-boats as they go, and when they arrive off the Heugh they spread their sails to the favouring breeze and skim away seaward.

Down the Tees a perky little steamer comes. Her jib is so full of wind that I expect every moment to hear it split with the report of a big gun. Just past the Fairway Buoy she turns her head southward and soon disappears in a contemptuous cloud of smoke—which somehow strikes me as being a very natural thing for her to do.

But the breeze is not long in removing this foul blot on the sea and sky. Then another fleet of fishing-

boats appears, their bare masts jerking about in the maddest fashion. First one bobs in the direction of Hartlepool—as though it would draw attention to the dazzling white lighthouse and the grand old tower of St. Hilda's, another awkwardly inclines itself towards Longscar and Seaton Carew ; and yet another begins to pitch Redcar-ways and ends by making a solemn obeisance to West Hartlepool instead. Thus they keep at it tirelessly ; and even when a tug comes out of harbour and lays hold of them they go into port bobbing in a bunch.

The afternoon wears away. That last gust of wind sent quite a chill through me, for it has come off the water, and the water looks black and cold. The sound of it is like the summer gale surging through a wood. No longer is there a merry lay from the sky-piercing lark. The droning of that bee among the white clover ceased long ago. And look ! there is a great smudge of smoke rolling in from seaward. It sweeps against the Yorkshire cliffs, clings to their expansive breasts with an almost loving fondness, and, parting, trails across their windy summits and rolls down into the wide, picturesque valley beyond. Thus does the afternoon depart.

#### IV

Rosy tints from the mid-July sunset have spread themselves over the dunes and softly stolen across the brown ripple-marks to the sea.

Night comes. The moon floods the bay with its silvery light. A shadowy ship sails on a silver track ; silver wavelets purl among the rocks, and a broad stream of silver ceaselessly ebbs and flows on the shore.

Then a heavy black cloud, silver-fringed, interposes between the moon and me. The silver track disappears, leaving the ship more shadowy than before ; the silver wavelets lose their brilliance ; the ebbing and flowing silver stream becomes dull and lifeless. The distant piers vanish into the dimness of the night.

But the twinkling lights around the margin of the bay twinkle more vivaciously. The great furnaces under the Cleveland Hills flare more fiercely ; and between them and me the shadowy ship comes stealthily sailing. For a few moments she is distinctly outlined. When she moves into the darkness again she takes the poetry of the picture out with her.

## V

One dark morning of late summer I awoke to find the air filled with the troubled rumour of the sea, and it inspired me with a feeling akin to dread. I never remembered the sound of the distant surf to have been so weird. It quite accentuated the silence of that dark, still morning and brought to me a sense of loneliness almost oppressive. I might have been lying awake on some surf-encircled isle in mid-ocean for all the consciousness I had of a human environment.

The sound started with a relatively high-pitched note and descended the diapason until it became a mere hollow rumble, heard ever so far off. It was as though the breakers had retired from the beach out into the middle of the bay. When the high note was again struck, one could easily imagine the waves to have returned right up the beach, just as the old impression revived that they had once more retreated seawards when the sound dwindled to low thunder.

I could fancy that the North Sea still growled after that recent storm which had strewn our coast with wrecks. It resembled a wild animal whose savage combat had deprived it of its strength and which had become reduced to impotent threatenings. How feebly did ordinary sounds contrast with that space-filling voice of the ocean! A few interposing footfalls; the sharp toot of a locomotive; the rush and rattle of a passing motor-car; the raucous blowing of a steamer's whistle,—all these things were but shadows compared with the substance of sound produced by the surf.

Daylight made the presence of this ocean voice less dominant, and when the streets awoke to life it no longer held the imagination under thrall, but was merged in the multitudinous—yet harmonious and companionable—sounds that rise from a flourishing seaport.

But the land simulated it in its volume and modulations. It, however, ran the gamut once only in the day. There was no quick succession of cadences such as the sea-voice produced. In the very early morning it was a thin, wavering note, yet clear and distinct. Gradually it deepened into the mutterings of far-away thunder, which drew nearer and nearer until it could be likened to the muffled boom of heavy surf. Then by slow degrees it subsided to the lulling murmur of midnight and I again heard the sound of the sea rising and falling with the swaying currents of air, and again there came that strange feeling of loneliness.

Perhaps in those sad notes the sea sang a dirge for the dying summer.

## CHAPTER VIII

### GLOW-WORMS AND STARS

ONE of my daily French newspapers—it was *Le Journal*—I found to contain a charming article by Rémy Perrier on “La Lumière Vivante” :

Dans la splendeur des belles nuits d'été, le ciel n'est point seul à se parer d'étoiles ; la prairie participe, elle aussi, à l'universelle allégresse, et partout, dans les herbes, dans les buissons, elle allume d'autres mystérieuses petites étoiles, aussi belles, aussi pures que leurs sœurs du ciel.

Mais ces étoiles de la terre, ce sont des étoiles vivantes, et ce sont des étoiles d'amour. Le ver luisant qui les allume est une humble petite épouse, qui attend, immobile et patiente, la venue de l'aimé ; mais le volage a des ailes qui l'entraînent et il tarde parfois à répondre au signal qui lui apporte le doux message d'hymen.

There is poetry in those lines of prose, and I wish my English rendering did full justice to them :

In the splendour of the beautiful nights of summer the sky is not alone in decking itself with stars ; the meadow participates, it also, in the universal joy ; and everywhere, in the grass, in the

thicket, it is aglow with other mysterious little stars, as lovely, as pure as their sisters in the sky. But these stars of earth, they are living stars, and they are stars of love. The glow-worm that kindles them is a lowly little spouse, who awaits, motionless and patient, the coming of the beloved; but the fickle one has wings that carry it away, and it responds tardily at times to the signal that bears to it Hymen's sweet message.

The comparison of the glow-worm with a star is, in one sense, apt, for the light of these little creatures is of a greenish colour, which is not unknown among the stars.

Was it not Miss Seward, the old-time poetess, who was astonished that poets had overlooked the stellar light of the glow-worm; though I believe she relates of "Ossian" that green stars are therein mentioned frequently. For my part, I have not found many direct references to such stars in Macpherson's gloomy, weird work. Darwin, I observe, makes no allusion to the stellar light of the lampyridæ which he caught at Rio Janeiro. The greater number of the specimens were of *lampyris occidentalis*, to which family our own glow-worm belongs. He found that *lampyris occidentalis* emitted the most brilliant flashes when irritated. On the muddy and wet gravel-walks he found the larvæ of this *lampyris* in great numbers. They resembled in general form the female of the English glow-worm, but possessed only feeble luminous powers. On the slightest touch they feigned death and ceased to shine; nor did irritation excite any fresh display.

Neither does Humboldt, so far as I can find in his

“ Personal Narrative,” mention the greenish light of the glow-worm. In descending the little river Manzanares, the thorny bushes on the adjacent arid land glittered during the night with thousands of luminous sparks. The traveller in the equinoctial regions, he adds, is never weary of admiring the effect of these “ reddish and movable fires,” which, being reflected in limpid water, “ blend their radiance with that of the starry vault of heaven.” At Trinidad, also, he relates that the grass, the branches and foliage of the trees, all shone with that “ reddish and movable light which varies in its intensity at the will of the animal by which it is produced.”

Though, as I have said, the colour-comparison of a star with a glow-worm is apt, the comparison as a whole is not so fortunate, for does not that patient and accurate observer, Gilbert White, tell us that the glow-worm puts out its lamp between eleven o'clock and midnight, and shines no more until the following evening, whereas the stars——.

The French writer's reference to the “ fickle one ” having wings is in accordance with scientific fact. In a foot-note to the above-mentioned allusion in White's *Selborne*, Wood says : “ Both sexes of this curious beetle give out the peculiar greenish light, but that of the male is very faint indeed. As is not infrequently the case with insects, the male only is furnished with wings, the female compounding for the plainness of her form by the brilliancy of her light.” But the science embodied in Rémy Perrier's pretty conceit does not so much appeal to me as the poetic glamour with which he has so entrancingly invested the conceit.

## STARS WITH LOW ALTITUDES

The subject of the visibility of stars at unusually low altitudes, Mr. E. W. Barlow informs me, has been suggested to him by some remarks in my *Night-Skies of a Year*. At Bournemouth, it seems, they are occasionally favoured with marvellous skies. Here are some of Mr. Barlow's notable observations, made from, approximately, north latitude 50 degrees 43 minutes 13 seconds.

July 18, 1911, 10.40 p.m. Saw Epsilon Sagittarii (mag. 2) with naked eye (South Dec.  $34\frac{1}{2}$  degrees). With opera-glass plainly saw Eta Sagittarii (South Dec. 36 degrees 45 minutes; altitude above sea horizon  $2\frac{1}{2}$  degrees).

July 22, 10.30 p.m. Saw Lambda and Upsilon Scorpii with opera-glass, one hour and 20 minutes past the meridian. As the meridian altitudes are only 2 degrees 15 minutes and 2 degrees 4 minutes respectively, at this time they cannot have been more than one degree and  $\frac{1}{2}$  a degree respectively above the horizon. At 10.45 Lambda still visible.

August 31. A most extraordinarily brilliant night. Earth-light obvious to sight at 11.0 p.m. (I have a note that Vega, Altair, and other bright stars gave the merest suspicion of a twinkle every  $\frac{1}{4}$  or  $\frac{1}{2}$  minute.) I made the remarkable observation with opera-glass of the setting of Delta Sagittarii behind distant cliffs (altitude of top of cliffs 21 minutes of arc). The star was followed distinctly, but with great difficulty to within a few seconds of its touching the cliff tops, which were visible by

reason of the earth-light. Gamma Gruis (nearly on meridian ; altitude about one degree 27 minutes) was distinct to unaided vision, and Gamma Sculptoris with opera-glass.

Mr. Barlow utters the caution, however, that it is only on very few nights in the year when such observations are possible.

### A STAR-SPECTRE

I name it so because it is such to me. It comes when the leaves begin to fall, and it goes while yet they are still falling. Unobtrusive to coyness almost, it nightly moves through its little arc in the dim southern sky ; a brief spell of cloud or a thickening of the vapours citywards o' nights, and lo ! the star-spectre appears no more. Fomalhaut—for it is of this bright orb of the other hemisphere, the lucida of Piscis Australis, that I speak—is, from my latitude, extremely susceptible of atmospheric variations. Scarce seven degrees above my horizon, at most, does it come, and it had need to be big and bright to be seen across the city.

Victor Hugo, in his *Les Travailleurs de la Mer*, tells us in that weirdly Homeric combat between Gilliatt and the devil-fish that “pour la pieuvre, comme pour le taureau, il y a un moment qu'il faut saisir.” My opportune moment with Fomalhaut came one transparent night in the middle of September, when I saw the star flitting ghost-like just beyond the meridian. Only for a few minutes did it remain in view. Yet I have no envy of other and better-placed observers. Who knows but that Fomalhaut may lack to them that

novelty which it has brought to me, with all my mist-shrouded horizon? I fear it would be shorn of much of its present interest to me were it to rise to the altitude of, say, Regulus, or Aldebaran, or Capella, or perhaps, even the Dog Star.

It was surely anomalistic that I should obtain my first clear view of Fomalhaut by going further north. My point of observation was on the Durham coast; consequently the star crossed the meridian at an altitude of only about five degrees. It twinkled—with a whitish light, I thought—so low down as merely to skirt some small trees placed at a distance of a hundred yards or more. Anyone might easily have mistaken it for a street lamp. I have said that this was on the Durham coast; to be exact, it was at pleasant, suburban Foggy Furze, between West Hartlepool and Seaton Carew. The last-named little seaside resort lingers lovingly in my memory, for oft from there have I watched the summer stars come up out of the North Sea, mingling their far-off beams with the quiet lights of passing ships.

When we see Fomalhaut—and this never fails to interest me—we indeed get a glimpse of the Far South. It is a star that raises visions of a land much more southern than does the sun at the Winter Solstice. Fomalhaut, in fact, is thirty degrees below the Equator. Yet in gazing upon it, one calls to mind that it is nearly overhead at Brisbane, at Sydney, at Adelaide, and at Melbourne. At Durban, too, that enterprising city of Natal, it will be almost in the zenith. On the other hand, I have sometimes wondered if it has ever been seen from St. Petersburg, where, at sea-level, it should be, theoretically, a fraction of a degree above

the horizon. At Stockholm, too, I wonder, has Fomalhaut by any chance ever been visible.

It is suggested to Mr. Bernard R. Body, of Harrogate, that there would be a certain amount of interest in noting during the year not only the most southern star visible from his station without optical means, but also those of the northern circumpolar stars most distant from the pole, when such stars had reached the exact north point of the horizon. Mr. Body informs me that on every occasion when he observed Fomalhaut during last (1914) autumn it was in a slight haze, "notwithstanding that its greatest elevation is considerably more than that of Vega at the latter's least altitude."

## CHAPTER IX

### CONCERNING TWO SUN-ECLIPSES

VAVAU, an island of the Tonga group, was selected by the British Government Expedition as the observing station for the total eclipse of the sun in April, 1911. It was humorously suggested by the Rev. Aloysius L. Cortie, however, that a certain other island might constitute a favourable position, but as it periodically appeared and disappeared, it was thought advisable not to choose it.

It was on Vavau that Father Cortie experienced his first earthquake. One curious effect of the tremor was that Mr. McClean's instrument, which was not in perfect adjustment, was shaken into its proper place.

This eclipse was a light one owing to the cloudy state of the sky. The reflection from the clouds, indeed, was so great as to make the use of lamps unnecessary.

I am often asked when we shall be favoured with another total sun-eclipse in England. My answer is : Not until 1927. It is an answer which usually produces a look of blank disappointment. We are certainly not bored by the frequency of total solar eclipses. The last to be seen in any part of our country was in 1724, and it appears to have had the distinction of having been observed by only one person. He was stationed at Haraden Hill, near Salisbury Plain.

Some years ago I was privileged to see a map of England on which the late Rev. S. J. Johnson had indicated the totality track of the 1927 eclipse. From this, it would seem, the actual central line passes through Rhyl, Richmond (Yorkshire), Darlington and Hartlepool. The entire track from which the sun will be seen to be totally eclipsed takes in North Wales, Central Lancashire, the northern part of Yorkshire, and the southern districts of Durham County. About fifteen miles on each side of this central line marks the extent of the track of totality, and beyond that limit the sun will be eclipsed in a greater or less degree according as one is near or away from the fifteen-mile limit.

Thus, it is calculated that Liverpool, being just within the southern edge of the track, will have but a momentary total eclipse. That, however, is no reason why the citizens of this fine city should not journey to places well within the track of totality, or even to the central line itself, in order to increase the duration of the total phase. I have never yet found the Liverpool citizens averse from an outing to restful Rhyl, even without the attraction of a total eclipse. Manchester is shown by the map as unlucky enough to be just outside the territory of totality, but if I know the Mancunian, he will not be content to remain outside of it on June 29, 1927. The hardy sons of Durham County and Northumberland will concentrate upon Hartlepool and Darlington; the breezy Yorkshiremen upon Richmond and the heights above Swaledale, for will it not be all in the summer season, when these several spots are delightful to visit? I know each and every one. What happy times——, but that is another matter.

## THE NIGHT-SKY IN FIJI

## I

From Suva, Fiji, I received, during October, 1911, this deeply interesting communication. The writer was Mr. Hugh Daniel Badcock, M.A., M.INST.C.E., then H.M. Commissioner of Works at Suva.

“One of the chief advantages of an amateur study of astronomy is that it makes one feel at home in the most out-of-the-way places. Years ago, when sleeping on the open veld, during the South African war, I used to look out night after night into the wonderfully clear skies of the Transvaal and watch my old friends among the zodiacal constellations pass in orderly procession from dark to dawn. By day, I was in a strange land, with strange companions, and in altogether unwonted circumstances. By night, I might have been at home again, peering from my bedroom window at the stars I had known from childhood. Here in Fiji, separated from England by almost the diameter of the earth, it is still the same. Indeed, if I were asked what feature of the sky makes the most impression in the tropics, or in any land, for the matter of that, I should pick out this familiarity. It is true, of course, that there are a few striking constellations, such as the Southern Cross and the incomparable region of Argo, which are not visible at home, but here we see our old friend the Great Bear as well—though not so often as in England—and everything south of him. Cassiopeia hugs the horizon, but the “W” is distinctly seen, and really the Little Bear is the only striking constellation that cannot be picked out at all.

“ The second feature that attracts one’s attention is the fact that nearly everything appears upside down. I say nearly everything advisedly, for constellations such as Sagittarius, Scorpio and the Whale, which pass across the zenith, can be looked at as naturally one way up as the other, or in some situations more naturally, in the position in which they are seen from home. Still, on the whole, this is a very striking feature. The Bear on his head with his legs kicking up in the air is often not recognised by strangers to these latitudes, and I have often heard it denied that he is visible at all by old residents, who have only to open their eyes to see him for hours during half the nights of the year. Somewhat in the same way, but in a less degree, is one struck by the course of the planets. Instead of seeking them near the horizon, we may see them pass right across the zenith, and the difficulties of observation are oftener that they are too high to be conveniently looked at, than too low for clear vision. Saturn, Jupiter and Mars are here well seen long after they are too near the sun to be readily observable at Greenwich. Venus at her elongations is often so high that a new-comer can hardly believe it is herself, and Mercury, instead of being an exceptional sight, is frequently a striking object for days together. I remember being badly let down by Mercury during my first year in the Southern Hemisphere. I looked out one evening and saw a star in the Lion, much brighter than Regulus. It appeared considerably higher above the horizon than Mercury could possibly be after sunset, and a great deal brighter also than I imagined he could be. I had often looked for him in England and failed to see him. The next evening, of

course, settled the question, but for twenty-four hours I was wildly excited by the idea that I had seen the outburst of a new first-magnitude star. Incidentally, I may mention here, as an instance of the opportunities given by these latitudes for observation, that on one occasion I saw every single planet, from Mercury to Neptune, between sunset and sunrise. Venus, when well situated, can always be seen before sunset if you know where to look, and I once picked her out at two o'clock in the afternoon with the naked eye.

## II

“ We read a great deal of the marvellous clearness of the tropical night. But perhaps this feature has been made too much of. It is perfectly true that there are nights which appear ever so much clearer than those you get at home, but, in Fiji at any rate, they are very rare. We had one of these nights a week or so ago, on which one could hardly have wished anything better from dark to dawn, but in my two and a half years' residence I have never seen another. The usual night is more or less cloudy. Half an hour brilliant perhaps, and the rest nowhere. Often, however, we hardly catch a glimpse of the stars from week-end to week-end. I watched Halley's Comet every morning for nearly a month. Its tail here was, at the best, a truly magnificent object, stretching for ninety degrees and more from the horizon, but I cannot be certain that I ever saw the whole of it at any one time ; some portion was always veiled by passing clouds or mist. The moon is exceptionally brilliant ; one can easily read by its light when full and the night is clear.

Venus, too, blazes with a glory that I never remember at home, and the Milky Way is altogether a different object. I do not think, however, that these sights are due so much to the atmosphere as to the altitude of the objects."

## III

After this graphic description by Mr. Badcock of the Fijian night-sky, perhaps a little pen picture of an English morning-sky may not be out of place. It depicts what I saw from my then Northern home on February 20th, 1907. It was written out in the open air.

In the magnificent sky at six o'clock this morning Mars and the gems of Scorpio, near the meridian, composed a glorious scene. The red planet and the great southern red star Antares were within five degrees of each other; Beta and Delta Scorpium were to the right of the planet; Antares was flanked by Sigma and Tau. A goodly company, truly, against the dusky blue sky of the windy morning! The star was much redder than the planet.

Away to the right of these fiery objects, and at a somewhat higher level, sparkled the blue-white Spica, hanging, with the other stars of Virgo, over the south-west horizon. And in a straight line high upward was golden Arcturus, brilliant and beautiful.

On the southern sky-line lay a heavy bank of blue-black cloud. Antares was on its fringe, and as I watched it there came a sudden burst of light in the south-east. It was positively startling. Had a great meteor blazed out? No, Venus was but

heralding the day, and had emerged from behind the cloud-bank into the pearly light of dawn, and there she shone, dazzling to look upon.

And here are some notes of a Northern night-sky which I took under the stars on Saturday, March 4th, 1911: "How exquisite the scene in the south-west this evening of early March! The crescent moon; Saturn closely attendant upon her; the big silver lamp of Venus showing them to their setting. That wonderful earthlight on the moon, too! Is it cendrée, ashen? Or olive-coloured, as Lambert described it well over a century ago? It is both by turns; ashy, when in the deepening twilight it timidly insinuates itself on the fascinated sight; olive, when darkness at length has crept upon the earth, and lordly Orion and the rest of the winter constellations blaze out in all their glittering splendour. A charming nocturne! The memory of such scenes as these dies only with death itself."

## CHAPTER X

### THE HORIZON MOON

Most people have been struck with the weird bigness of the moon on the horizon, and, I dare say, the great majority of them take it for granted that our satellite is actually larger when it is rising or setting than when it has got well up in the sky. I have myself seen it appear—from the Channel—as large as six meridian moons rolled into one. But it is all a deception.

A few years ago Mr. Chas. Macnamara, of Arnprior, Ontario, told me of a simple photographic experiment which he had made, whereby this appearance of horizontal enlargement was graphically shown to be purely illusory. One fine September evening, at his Canadian home, he focussed an ordinary whole-plate camera on that part of the horizon where the full moon was about to rise. Just as the upper limb appeared the shutter was opened, and an exposure of half an hour was given. The moon described a broad path on the plate, which path was exactly of the same width throughout. Yet to the eye, said Mr. Macnamara, our satellite looked enormous as it rose above the distant trees, whilst at the end of the half-hour it had dwindled to the usual size it appears when high in the heavens.

What disquisitions have been written, what geometrical figures drawn, what bewildering mathematical calculations have been made to explain this optical effect! And how many more geometrical figures have been drawn and bewildering mathematical calculations made to prove that the explanation could not possibly be correct!

For my part, I think all we can be positive about in regard to this horizon moon is that it looks a startlingly big moon to the human eye, and that to the camera it is quite an ordinary moon, as Mr. Macnamara has clearly and ingeniously proved. The bigness lies in the human eye. Hence, it seems to me possible that as the quality of vision varies, one observer may be sensible of a horizontal enlargement which to another does not exist, or which may exist in a lesser or a greater degree.

## THE INVERTED MOON

There is in the moon a fancied figure which bears an extraordinary resemblance to a French poodle sitting on its haunches. A young Western Australian wrote to Mr. J. G. Talbot Hassell to say that when the Poodle was looked at from that part of the world it was upside down.

“Last night (May 1st, 1912),” the letter ran, “when the full moon rose the Poodle was standing on its head, and when we got up this morning in brilliant moonlight it was lying on its back with its legs pointing downwards, thus showing, or seeming to show, that the moon gradually turns round. By the time it gets to England you see it rise with the Poodle standing on

its legs, and by the morning it is, I expect, diving down on its head, ready to be standing on its head when it rises again in Australia."

In forwarding the letter to me, Mr. Hassell accompanied it with a series of diagrams illustrating the Poodle's position on an evening and morning in Western Australia and in England. The youthful correspondent found it difficult to realise that the moon's face could wear such a different aspect in the two countries. The sketches were made in England during the Spring of 1911, and in Western Australia in May, 1912.

It is evident that the moon was "upside down" to the observer in Australia because the observer was south of its position. It is evident, also, that the place of observation must have been below seventeen degrees south latitude, for that was, approximately, the moon's declination on May 1st, 1912.

Had the position been north of seventeen degrees, it would have been necessary to look towards the south in order to see the moon, when, of course, our satellite would appear just as it does to us in England. Were the position, however, exactly corresponding to the declination of the moon, then that body would be right overhead. If, then, the observer faced south and looked to the zenith, he would see the Poodle as we see it; if he faced north and looked upwards, he would see the Poodle "upside down."

It will be seen that one need not quit the northern hemisphere in order to invert the moon, for suppose the moon to be twenty degrees north of the Equator, the observer would be able to get south of it and see it inverted while he was still well within the northern hemisphere.

## THE MIDNIGHT SUN

A Scandinavian Arctic explorer, I see from an extract from one of his books, tells us how very prosaic a spectacle the midnight sun really is, so different from what he thinks people believe it to be, for, says he, "one ought, of course, to paint a splendid sky, with colours such as never mortal saw." Now, I have conversed with a good many folk from between Tees and Tyne who have seen the sun at midnight; I have also spoken on the same subject with many Scandinavian seamen, but I cannot honestly say that they expected anything in the nature of a "splendid sky with colours such as never mortal saw." I rather think that the spectacle attracted the Britishers, at any rate, because of its novelty, merely because it was that of a midnight sun. Explorers ought to consider that we who have never entered the Arctic Circle and who are so accustomed to see the sun shine by day would deem it a very novel spectacle indeed to see it above the horizon in the dead of night. At the same time, I do not see why under certain atmospheric conditions it should not be set in a more or less beautiful sky and scene, instead of being, as the explorer is quoted as saying, "just a common or garden picture."

Almost at the first page on opening Dr. Hayes' *Narrative of a Voyage of Discovery towards the North Pole*, recently, I read this: "MIDNIGHT.—I have just come below, lost in the wondrous beauty of the night. The sea is smooth as glass; not a ripple breaks its dead surface, not a breath of air stirring. The sun hangs close upon the northern horizon; the fog has

broken up into light clouds ; the icebergs lie thick about us ; the dark headlands stand boldly out against the sky ; and the clouds and sea and bergs and mountains are bathed in an atmosphere of crimson and gold and purple most singularly beautiful."

That was written at the beginning of August, 1860, and he says further of that midnight sun scene : "The air was warm almost as a summer's night at home, and yet there were the icebergs and the bleak mountains, with which the fancy, in this land of green hills and waving forests, can associate nothing but cold repulsiveness. The sky was bright and soft and strangely inspiring as the skies of Italy. The bergs had wholly lost their chilly aspect, and, glittering in the blaze of the brilliant heavens, seemed, in the distance, like masses of burnished metal or solid flame. Nearer at hand they were huge blocks of Parian marble, inlaid with mammoth gems of pearl and opal. One in particular exhibited the perfection of the grand. Its form was not unlike that of the Coliseum, and it lay so far away that half its height was buried beneath the line of blood-red waters. The sun, slowly rolling along the horizon, passed behind it, and it seemed as if the old Roman ruin had suddenly taken fire."

Dr. Hayes' book, may I add, was a personal record of the events of the expedition which he conducted to the Arctic Seas to augment the proofs of the deductions of many physicists that the sea about the North Pole could not be frozen. He had previously acted as surgeon of the expedition commanded by Dr. Kane, of the United States Navy. Both Kane's and Hayes'

books are among my favourite works on Arctic exploration. So many cultured Americans have, I think, the literary gift. I have among my own correspondents from across the Atlantic one who favours me with occasional literary contributions. He is Mr. Charles Nevers Holmes, of Boston. Recently, he sent me a description of a night-sky in his district, and thus concluded it : " Seasons wax and wane, centuries pass, countless hosts of men and women are born and die, nations arise and fall, even terrestrial life becomes a mausoleum ; but these suns, other suns of the universe, blaze on ; their satellites still revolve around them ; Time—eternity itself—still flows, like some endless, everlasting river, and he who stands beneath the star-lighted dome of night and gazes upon its sparkling and scintillating suns and constellations, will view the same firmament that his ancestors saw, the same firmament that his descendants shall see centuries and centuries in the silent future."

From the American Magazine *Popular Astronomy* I cull these lines of verse from Mr. Holmes' eloquent pen :

When royal Rigel glitters like a gem  
 Where gleams Orion's glory in the sky  
 And Queen Capella like a diadem  
 Reigns o'er Auriga with a watchful eye ;  
 When winter's thraldom rests on vale and hill,  
 And skies are clear, and stars shine coldly bright,  
 Ere most men dream or city's voice is still,  
 King Sirius again adorns the night.

Rigel, as I write this page, " glitters like a gem " and " Orion's glory " is in the southern sky, while " King Sirius again adorns the night." Though I do not at the moment see his piercing light, I know that it darts

on to the curtained window near to which I am seated. But the "city's voice"—the mighty voice of London—is never still. It was roaring when King Sirius rose into the night and its war-darkened streets will be roaring when he sets.

## CHAPTER XI

# WORK AT AN AMERICAN OBSERVATORY

### I

It is of a year's work at Flagstaff Observatory by Dr. Percival Lowell and his assistants that I write—the year which ended in April, 1914. There is always something that grips my imagination about the labours of the American astronomers; not only do they seize upon whatever is of general interest, but they have a positive genius for presenting results in the most picturesque and pleasing form. At Flagstaff Observatory, then, during the year in question, the staff gave systematic study to the planet Venus in order to determine its rotation period. There is, as must be well known, a great deal of uncertainty concerning the time which Venus takes to rotate on its axis, owing to its dense cloudy canopy—which gives the planet such a brilliant appearance—concealing the surface markings. At various times, observers have suspected the presence of such markings, but Dr. Lowell and his staff have discovered some of a spoke-like nature, and not only have they discovered them but they have confirmed them and completed their detection. This is of the highest importance and

should settle once and for all the vexed question of the length of Venus' day.

But Dr. Lowell's name is more closely identified with the planet Mars, a body about which, it can safely be said, he knows more than any other living man. So we are told that the deposition of hoar-frost was detected during the Martian October; that the rotation period is 24 h. 37 m. 22·58 s.; that the canals and oases were shown as fine geometric lines and dots by the 40-in. reflector, fitted up for visual work by the introduction of a divergent lens, and that two Martian dust-storms were seen on January 31st, 1914. By this it will be understood that there is not much taking place on the planet Mars that the Argus-eyed ones of Flagstaff Observatory are not cognisant of.

Then the Pleiades and the Andromeda Nebula—both very popular celestial features with amateur astronomers in this country—have received close and skilful attention. Photography years ago showed that the Pleiades were surrounded by nebulous clouds, and now Dr. Lowell comes forward with the submission of there being strong evidence that the nebula near Merope is pulverulent matter shining by the reflected light of the neighbouring stars. As to the Andromeda Nebula, Dr. Slipher, whose special domain is the world of spectra, shows its spectrum to be of a pure stellar type, closely approaching that of the sun. This immense and profoundly remote object is proved by Dr. Slipher's radial velocity observations to be moving towards the sun, whilst other spiral nebulae are shown to have a much higher order of velocity than have the stars.

Another popular feature dealt with at the Obser-

vatory was the earth-shine on the moon. This is an appearance which is still a mystery to many people. In a previous chapter I have described it as ashen and olive-coloured by turns, but on the night of Saturday, February 20th, 1915, it was quite ruddy, much ruddier, indeed, than I had ever before seen it. The moon, which was nearly seven days old, was lowering in the west, and the sky was rather murky; indeed, I had expected a lunar halo appearing earlier in the evening.

Some years ago a Surrey correspondent asked me why the almanacs had omitted all reference to an eclipse which had occurred on the previous night. It turned out that the earth-light had been more than usually conspicuous. I had always thought this an odd mistake, but not after what I saw on the above-mentioned Saturday, for the moon then certainly seemed to be eclipsed, though, of course, a moment's consideration showed that the relative positions of the sun and moon made such a phenomenon impossible.

It is the light reflected from the earth which produces the eerie glow on the dark part of the moon. Dr. Slipher made some spectroscopic observations of this light, which have proved that our atmosphere is a very powerful reflector, thus corroborating the high value found theoretically by Dr. Lowell and more recently by Prof. Very.

In the course of a search for further satellites of Neptune no fewer than forty-nine new variable stars were found. In addition, forty-one asteroid images were discovered. When Dr. Lowell's report of this magnificent record of a single year's work at the Flag-

staff Observatory was laid before the British Astronomical Association's meeting, it was small wonder that Colonel E. E. Markwick, the President, should say that "the diversity of the branches of astronomy Dr. Lowell had touched upon was remarkable."

## II

It is perhaps appropriate that I should mention here a recent suggestion concerning the irrigation of the planet Mars. Dr. Lowell's observations show that whatever it is that melts at the Martian polar caps it is apparently carried towards the equator and then on to the other pole, where it freezes. In due season it again melts and again moves towards the equator, the impression being that it is assisted across the planet by some artificial means or other. Mr. C. E. Housden, of Chiswick, however, suggests that the Martian water has to be driven over the planet through pipes and distributed as "artificial rain" by means of mechanical sprinklers where it is most required. He is of the opinion that the amount of water available from the polar caps is quite insufficient to secure the growth of vegetation on Mars all the year round, and believes there may be additional supplies from springs, or deep wells and artesian borings in the oases or other parts of the extensive blue-green areas and in the central desert oases. The chief desert supply centre he places at the Trivium Charontis, at the foot of Elysium. Each source of supply, it is suggested, could be so utilised as to supplement the others, and thus provide for the irrigating of the entire surface. It is admitted by Mr. Housden that water is scarce on

Mars, but he sees no reason why the irrigation of the twenty-one million miles of its surface should not be secured twice annually. It may be, indeed, that the planet has more water than we dream of. In such case, Mr. Housden can conceive of its being contained in covered reservoirs to prevent evaporation. Surely no body in the universe is so much theorised upon as Mars.

## MOON STUDY

### I

In this present year of grace one thousand nine hundred and fifteen, there are many signs of a revival of interest in the study of the moon. I would instance as especially active in promoting that revival, Miss A. G. Cook, of Stowmarket; Mr. Walter Goodacre, of North Finchley; Mr. G. P. B. Hallows, F.R.A.S., of East Howe, Bournemouth; Mr. Wm. Porthouse, of Manchester; and Mr. J. G. Burgess, of Worthing. The study of selenography undoubtedly grows in favour on acquaintance, and I have frequently pondered over the reasons why it has never been very popular. Mr. Porthouse has been good enough to send me his views on the matter. In his opinion the reasons for the neglect are (1) lack of facility in drawing; (2) lack of knowledge of mathematics; (3) telescope too small; (4) absence of a definite programme of work.

As to the first-named of the above reasons, he holds that not much skill is required to turn out useful drawings of lunar formations. Mr. Porthouse himself appears to execute them with ease, for he has been good enough to send me some, the graphical skill of which I

greatly envy. At the same time, he does not altogether admit that drawings are essential so long as the written notes are sufficiently detailed, though, of course, an accompanying sketch or two adds to the value of the notes. There is certainly hope for us all when we learn that the celebrated Schröter, who may be looked upon as the Father of Selenography, was but an indifferent hand with the pencil.

Concerning mathematics as an alleged drawback, Mr. Porthouse contends—and very properly, too—that an absence of knowledge of them should not stand in the way of lunar observation. Very little mathematical computation is required for the work. Neither, in regard to reason No. 3, is a giant telescope necessary. “The most valuable lunar work appears to have been accomplished with moderately sized instruments,” my correspondent says, “and the foundations of selenography were undoubtedly laid with instruments decidedly on the small side.” Beer and Mädler’s instrument was only  $3\frac{3}{4}$ -in. aperture, and Neison’s great work on the moon was the result of long years of labour with a 6-in. refractor.

The absence of a set programme of work is, in Mr. Porthouse’s opinion, the greatest stumbling-block to the lunar observer. Time is wasted on casual observations, which, being without definite aim, are unfruitful of result. On this point, my correspondent offers the following sound advice: “When choosing objects for observation do not be tempted to range over too wide a field. Rather devote your activities to the detailed and systematic study of a limited number of formations, making a point of observing and sketching these objects under as many differing angles of illumination

as possible. Have some mature idea of the lines you intend to follow when you set out at first in the work of lunar observation—some purpose in view—and do not be seduced from that purpose.”

The tyro in selenography may here be reminded of what Elger said, namely, that however indifferent a draughtsman an observer may be, if he endeavour to portray what he sees to the best of his ability, he will ultimately attain sufficient skill to make his work useful for future reference. In any case, it would be of more value than a mere verbal description without a sketch. Elger recommended thirty-five miles to an inch as the scale of drawings of lunar formations. Mr. Porthouse says that in his own case probably ten miles to an inch is about the minimum. He regards as the most effective drawings those which are made on a big scale and afterwards reduced by photography.

On the whole subject of lunar study, it is indeed pleasant to be able to record the activities of such a devoted band of amateurs. From Mr. Hallowes, I learn that he has got his new 12½-in. reflector to work, and Mr. Scriven Bolton recently informed me that he was busy with the mounting of a 26½-in. reflector. Mr. Bolton is one of the most skilful all-round astronomical draughtsmen to be found in the country. His private observatory is situated at Bramley, on the outskirts of the great industrial city of Leeds. It overlooks the river Aire, as well as the famous Kirkstall Abbey. Not far away resides that enthusiastic lover of the stars, Mr. J. G. Talbot Hassell. Many a brilliant night-sky have I seen in that district.

## II

Having dealt with the practical side of selenography, I should like, if I may, to touch upon one or two pictorial features of our satellite. Scarcely necessary is it to make more than a passing mention of "The Lady," "The Kiss," or "The Poodle"; they have received my attention elsewhere. "The Moon Maiden," however, though not by any means a new feature, is one perhaps not so generally known, as the figure can best be seen only with a telescope, say, of from two to three inches aperture. Mr. C. H. Cooker, of Rugby, who has made some highly successful drawings of it, has very kindly described for me how to find this "Moon Maiden." First of all, the figure can only be seen when the sun's rays illuminate that particular portion of the lunar surface at a certain angle and direction. Consequently, it is visible once only in each lunation for a few hours, and then but seldom under quite suitable conditions for observation.

It is to be found in this way: "When the moon is about ten days old, a telescope with a power of from 80 to 120 should be directed to the Sinus Iridum, or Bay of Rainbows, and the retreat of the terminator carefully watched as the sun rises on the Bay. Its movement is at the rate of about half a degree in one hour, so that considerable changes of aspect may be noticed between several observations during the same evening. In a position of mean libration the terminator will reach 35 degrees east longitude at about ten days nine hours, and the sun will be rising on Cape Laplace, the western extremity of the Bay, and casting a sharp-pointed shadow many miles to the

east. The cliffs forming the eastern arm of the Bay will be seen as if hanging out into space, like a string of pearls on black velvet. With the advance of the sunlight to about 36 degrees east longitude the southeastern extremity of the Bay, known as Heraclides Promontory, which towers to a height of some 4000 feet, will gradually assume the profile of a girl's head and shoulders, with long flowing tresses streaming out behind her into the darkness. The Moon Maiden seems to gaze across the Mare Imbrium, or Sea of Showers, towards the small craters Helicon and Leverrier, each only about twelve miles in diameter."

Observations of this interesting figure were made by Mr. Cooker on February 5th, 1913, at about 8.30 p.m., and on December 27th, 1914, at 4 p.m., when the head "stood out like an exquisite cameo." On each occasion the moon's age was 10 days 13½ hours. The Rev. F. B. Allison, of Peasmarsh, Sussex, and Dr. C. S. Ticehurst, of Playden, have each had excellent views of the "Maiden." The former has stated to me that his first glimpse of it was in 1895, when he had no previous knowledge of its existence; it struck him at once, and was "so exquisitely finished that a Phidias or Thorwaldsen seemed to have been up there at work."

It would certainly be interesting to ascertain the first recorded observation of this charming "Moon Maiden."

At the beginning of 1914, Mr. H. Tompkins, of Stroud Green, N., perceived at noonday on the lunar Apennines a formation which, from the original drawing of it forwarded to me, bears a wonderful resemblance to a butterfly with expanded wings. Hence, he has named

it "The Butterfly." Curious to relate, the feature is not shown in any photograph of that region which he was able to inspect, but whether that was due to lack of difference of actinic value of the light reflected by the portions or to the rarity of the appearance, he was not able to say. He observed it at the following lunation, when it was not quite so conspicuous. It should be looked for, he says, about twenty-four hours after full moon. Shortly before Christmas of 1914, Mr. Tompkins informed me that it appeared to be a relatively rare occurrence to get a good resemblance, as although he had since observed close approximations to the phenomenon, it had never been quite so good. That, I believe, is not an uncommon experience in regard to the observation of these fancied moon-figures.

## CHAPTER XII

### STARS IN DAYLIGHT

#### I

WHEN I read lately that from the top of El Misti, in Peru, at an altitude of about 19,000 ft., the sky was found to be somewhat darker, or of a deeper colour, than at sea-level, but that no stars were visible with the naked eye in the day-time, I was reminded of a passage in that very delightful book in which Albert Smith tells the *Story of Mont Blanc*. It is therein related how that De Saussure was at some pains to experiment upon the intense blue colour of the sky at great altitudes, and how, before he quitted Geneva for his memorable ascent of Mont Blanc, he prepared some sheets of paper of sixteen graduated shades of blue. They were from the deepest colour to the palest tint; they were, further, numbered from one to sixteen; and three sets of them were made. One set he left with his friend, M. Senebier, at Geneva; the second he gave to his son, who remained at Chamouni; the third he carried to the summit.

On the day of the ascent he found the sky at Geneva to be of the seventh tint at noon; at Chamouni it was between the fifth and sixth; on Mont Blanc between the first and second—the deepest *bleu du roi*. The guides, who were all Chamouniards, and who included

such men as Pierre Balmat and Marie Coutet, told De Saussure that they had seen the stars in broad daylight, but De Saussure himself confessed that he could not detect them. Now Mont Blanc is not quite 16,000 ft. high ; El Misti is about 19,000 ft. high, and the stars from even its soaring summit are invisible with the naked eye in the day-time.

In my own experience, I have seen the planets Jupiter and Venus without optical aid just after sunrise, an hour or two after noon and half an hour or more before sunset, but not a star of any magnitude whatever. It is true that I have not yet descended to the bottom of a deep well, nor have I yet peered up the shaft of a tall chimney, nor, indeed, up through the mouth of a pit, but if I did do any of these things I should not expect to see the stars in broad daylight.

## II

One writer on astronomical subjects who has attained a considerable degree of popularity, has stated, I know, that for the stars to be seen in daylight it is necessary only to look up a vertical shaft. On the other hand, this is held by an astronomer of some authority to be "not proven." I myself do not forget that when Humboldt was engaged in practical mining operations and was spending a great portion of the day underground, during many years, he on no occasion was able to observe a star, though he could see the sky through the deep shafts. Neither, let me add, did he ever meet with any individual in the Mexican, Peruvian, or Siberian mines who had even heard of stars having been seen by daylight. This matter had

been with him a subject of inquiry since his early youth. He was aware that Aristotle had maintained that stars might occasionally be seen from caverns and cisterns, as through tubes, to which circumstance Pliny also had alluded. What the Greek philosopher said was this : “ Keeness of sight is as much the power of seeing far, as of accurately distinguishing the differences presented by the objects viewed. These two properties are not met in the same individuals. For he who holds his hands over his eyes, or looks through a tube, is not on that account more or less able to distinguish differences of colour, although he will see objects at a greater distance. Hence it arises that persons in caverns or cisterns are occasionally enabled to see stars.”

Narrien’s error in fancying that ancient astronomers made observations from caves in the ground was pointed out by the late Mr. W. T. Lynn thirty years ago. The mistake, Mr. Lynn thought, arose from using a Latin translation of Strabo, and confounding “specula,” an observatory, with “specus” or “spelunca,” a cave. If Narrien, he added, had consulted the French translation of Strabo—which was begun by order of Napoleon in 1805, and completed in 1819—he would have found the word properly rendered “une espèce d’observatoire.” The popular error is perpetuated in Washington Irving’s story of *The Alhambra*, thus : “He caused the cave to be enlarged so as to form a spacious and lofty hall, with a circular hole at the top, through which, as through a well, he could see the heavens and behold the stars even at midday.”

It is related by a correspondent to a North Country journal that when working at the bottom of a forty-

fathom shaft he frequently glanced upwards to listen to some instruction which was being shouted down by a banksman. On no occasion did he see a star, but only "the cage at the top, seemingly dwindled to something no bigger than a family Bible." The part of the sky which he saw beyond the cage was "just as bright and sunny—more or less—as it always is."

To a reader the editor of *The English Mechanic* replied: "At the bottom of a deep and steep valley, say in the Alps, the atmospheric conditions which allow of the stars being seen come at an earlier period than on the heights, of course, so that while it is daylight in one place, it is deep twilight in another place; but a well aperture does not allow of the gradations of light which admit of these effects. We have often tried to see the phenomenon, but without success, and we have inquired of others, without discovering anyone who has succeeded. Men accustomed to sinking mines will tell you they have heard that the stars can be seen but that they never happen to have seen them."

In the opinion of Mr. Whitmell there is no definite evidence that any star has ever been seen in broad day-time with the naked eye. Venus, at greatest brilliancy (which occurred shortly before he wrote to me on the subject) had a magnitude estimated at minus 4.4; "Sirius has a magnitude," he pointed out, "of only minus 1.58, and the difference is such as leads to the conclusion that Venus when brightest is  $13\frac{1}{2}$  times as bright as Sirius." Mr. Whitmell wondered if even Sirius had ever been seen in full day, when at a fairly good elevation in lower latitudes. He very much doubted it. In a subsequent communication, he said he did not know at what stage Venus could be

seen in full daylight with the unaided eye, but if we made the hypothesis that she was visible when, say, only half as bright as when brightest, she would still be six to seven times as bright as Sirius.

When one considers the whole of the evidence available one must be struck, as Humboldt was, with the "highly credible testimony of a celebrated optician" who, in his youth, "saw stars by daylight through the shaft of a chimney."

## PLANET NOTES

During the winter of 1914-5 Saturn was a very conspicuous object in the night-skies, especially when, in the early part of the season, it shone at the north-west angle of Gemini, a position in which Jupiter attracted so much attention at the opening of the year 1907. Writing to me at Christmas on this remarkable brightness of Saturn, Mr. C. Grover, of Rousdon Observatory, Lyme Regis, said :

Having high north declination, and with the ring almost at its widest opening, Saturn at once arrests attention even to the naked eye. And although the ring is, of course, quite invisible without a telescope, the superior brightness of the planet, when this appendage is presented at its broadest dimensions, is quite apparent to the ordinary observer. I have watched the planet at the disappearance of the ring in 1862, 1877, 1891, and 1907, and to the naked eye the planet about these dates was much less bright than now. It looked like a very dull first magnitude star, and

suggested a long period light variation in about 15 years. May we not have in this an explanation of some of the long period light variations among the stars ?

Mr. Grover observed the disappearance of Saturn's ring in 1862 with a little 2-in. achromatic. In telling me of this fact, he added : " I then little thought that about 20 years later (in 1882) I should have an opportunity of observing the planet with the great Melbourne reflector of 48-inches aperture, at that time a comparatively new instrument and in excellent working order. The views of some of the rich star clusters of the Southern Heavens with this giant telescope were a never-to-be-forgotten sight."

Some of the satellites of Saturn appear to vary in brightness, and it was while studying this interesting subject that I came upon Mr. W. H. Steavenson's observations at West Norwood. Employing a 3-in. refractor, he found that whenever Rhea was recorded as being visible it was almost invariably situated on the eastern half of the orbit, from which he concluded that this might be explained by an actual brightening of the tiny object. He accordingly observed the satellite for about forty nights, and found it " consistently brighter when on the eastern than when on the western side of the orbit." He suspected that it was faintest of all when in the northern quadrant of the western half of the orbit. When Mr. Steavenson laid his observations before the British Astronomical Association he was deservedly congratulated by the Rev. T. E. R. Phillips upon having accomplished such an excellent piece of work with a 3-in. telescope.

The crescent of Venus is far beyond the vision of the unaided eye, according to Mr. H. McEwen, of Mount Florida, Glasgow. A number of test observations showed that a magnifying power of at least five diameters is necessary to exhibit the crescent when the apparent diameter of the planet is, say, 58 seconds. Mr. McEwen thinks that seeing some of the large satellites of Jupiter, when they are suitably placed, without telescopic aid would be an easier feat. He observed Venus under almost ideal conditions at the western elongation of 1913 and found that the planet did not rotate rapidly; at any rate, the few markings visible in the central part of the disk maintained a fixed position relative to the terminator. A brilliant white spot was noted at the southern part of the planet, which spot could not be distinguished from a snow cap.

Venus was seen with the naked eye on June 21st, 1914, when it was 130 days past superior conjunction, by Mr. H. D. Fleming, of Banbridge, County Down, Ireland. He states that he set his transit instrument for the planet's meridian passage and then used the telescope merely as a pointer, by which means he was able to pick up the planet in a few seconds. This was his earliest observation of Venus with the naked eye at its southing.

The transit of Mercury on November 7th, 1914, was well observed throughout the country, judging from the reports sent to the Journal of the British Astronomical Association. Mr. H. McEwen, the director of the Mercury and Venus Section, states that he observed the transit from Glasgow with a 5-in. refractor, under favourable conditions. No ring

of light was seen round the planet outside the sun. The light spot, seen by observers in previous transits in the centre of the black planet, was visible, but was very minute and faint. Two other fainter points of light appeared shortly afterwards. An examination of them gave the impression that they were due to some optical phenomenon, though rotating the eye-piece or diagonal would not shift them.

Mr. Reginald Y. Marvin, observing from Bedford Hill, Balham, with a  $3\frac{1}{2}$ -in. refractor, saw Mercury for the first time through a telescope and was surprised to see such a large disk, though he thought that this might be due to the absence of irradiation. The planet in comparison "looked like an average-sized swan-shot, and could probably have fallen into either of the splendid groups of spots on the solar disk." He was under the impression that a halo could be seen at times round the planet, but doubted whether this might not be referable to atmospheric or optical causes. Mr. Harold Thomson, of Newcastle, using his  $12\frac{1}{4}$ -in. reflector, saw no white spots, white polar caps or light halos, and he found the planet blacker than the blackest portion of the spot group. Miss A. Grace Cook searched carefully for Mercury before contact but could not detect it. The planet and sunspots were excellently defined with the same focus. At no time during transit did Miss Cook find the planet perfectly round. Mr. J. H. Bridger, of Croydon, had at first some impression of the existence of a central bright spot and the halo, but subsequent better definition caused these appearances to vanish, which circumstance led him to the conviction that they were merely optical. To Mr. Alfred Parr, of Hampstead, the

planet appeared as a "perfectly round dot of inky blackness, while the nuclei of the group of spots were, as at the solar eclipse, dark grey in comparison."

The eclipse to which Mr. Parr alluded was that of August 21st, 1914. It was observed from London under ideal conditions. I saw the phenomenon at various stages of its progress. My first view was from Charing Cross, my next from near the Law Courts, then from Ludgate Circus, and finally from opposite the Mansion House. Mr. H. B. Adames, of Ilford, Essex, noted that the effects of this eclipse upon the general landscape were slight. The light at the time of greatest phase resembled that of a mid-winter noon. The reduction from this phase, at 12.14 p.m., was announced by the crowing of a cock. Mr. Adames took the temperature readings, which showed that the diurnal upward rise in the thermometric curve was arrested about half an hour after the first contact.

In regard to Mercury, I may say that Mrs. Fiammetta Wilson, of Bexley Heath, observing the planet with a  $3\frac{1}{2}$ -in. refractor during the summer of 1914, had occasion to note the obscuring effect of the prismatic colours visible when the planet was near the horizon.

## CHAPTER XIII

### ON SOME WEATHER PORTENTS

#### I

A LUNAR halo which appeared on the night of Christmas Day (1914) fully maintained the reputation of these phenomena as precursors of bad weather. Christmas Day itself opened with a thick fog, but the afternoon brightened a little. The halo became visible not long after dark, by which time the lower atmosphere was quite free from fog. The latter circumstance, in the light of what had gone before, betokened rain.

Next morning (Boxing Day) I was awakened by the dashing of hail against my window and the noise of the wind thundering in the chimney. On looking out, it was not the drenched and streaming street that first attracted my attention, but the remarkable redness of the sky in the south-east, which almost to the zenith was aflame, as though the whole of that quarter of London were on fire. The spectacle brought to my mind the saying which I had often heard on my native coast :

A red sky in the morning  
Is the sailor's warning.

The "warning," I must admit, was somewhat belated. The Christmas night halo, however, had saved the situation.

Even while the red sky lasted, rain began to fall

with the hail. Soon, this turned to a yet worse admixture of snow and rain, then to rain only. As the morning wore on, the downpour dwindled to a drizzle and ended in fog. The wind continued to fall with these graduated specimens of precipitation, until by the time the fog stage was reached a dead calm prevailed, in addition to a Spring-like mildness.

Was a similar moon-ring seen in the North Country, I wonder? Or in Scotland? The papers recorded a fierce gale on Boxing Day on the Scottish coast, when two lifeboatmen were drowned at the entrance to Peterhead Harbour while rescuing the crew of a Hull vessel. And I have it on unimpeachable authority that the water at Brighton on Boxing Day was "grand," a description which my young informant amplified by stating that "there were white waves as far as you could see."

## II

Among the most recent communications which I have received on this subject from correspondents is that of Mr. H. Janney, of Grainthorpe, Lincolnshire. He is convinced, as I myself am, of the lunar halo's significance as "a precursor of stormy and almost invariably wet weather." His diary shows that on three occasions between February 23rd and March 4th, 1912, a very conspicuous moon-ring appeared and was followed by "most unsettled and stormy weather." Between November 20th and 25th, 1912, three similar appearances became visible, and again was the weather "foul, windy and extremely wet." During the first ten months of 1914 Mr. Janney

recorded only one lunar halo—on March 7th. From November 25th to December 3rd of that year, however, he observed five of them. The late autumn and the early winter of 1914-5 were phenomenally wet and stormy. Before the bad observing weather set in, however (may I remark in passing), some excellent work was accomplished by the Rev. T. E. Espin, of Tow Law, Durham. About thirty-four new doubles were detected by him with his new 24-in. telescope after the 9th of September.

In Bates' *Naturalist on the River Amazons* there is testimony to the value of the moon-ring as a weather guide so striking that the reader will perhaps pardon me if I quote it in full :

On the night of the 22nd the moon appeared with a misty halo. As we went to rest, a fresh watery wind was blowing, and a dark pile of clouds gathering up river in a direction opposite to that of the wind. I thought this betokened nothing more than a heavy rain, which would send us all in a hurry to our cabins. The men moored the vessel to a tree alongside a hard clayey bank, and after supper all were soon fast asleep, scattered about the raised deck. About eleven o'clock I was awakened by a horrible uproar, as a hurricane of wind suddenly swept over from the opposite shore. The cuberta was hurled with force against the clayey bank ; Penna shouted out, as he started to his legs, that a *trovoada de cima*, or squall from up river, was upon us. We took down our hammocks, and then all hands were required to save the vessel from being dashed to pieces.

The moon set, and a black pall of clouds spread itself over the dark forests and river ; a frightful crack of thunder now burst over our heads, and down fell the drenching rain. Joaquim leapt ashore through the drowning spray with a strong pole, and tried to pass the cuberta round a small projecting point, whilst we on deck aided in keeping her off and lengthening the cable. We succeeded in getting free, and the stout-built boat fell off into the strong current farther away from the shore, Joaquim swinging himself dexterously aboard by the bowsprit as it passed the point. It was fortunate for us that we happened to be on a sloping clayey bank, where there was no fear of falling trees ; a few yards farther on, where the shore was perpendicular and formed of crumbly earth, large portions of loose soil, with all their superincumbent mass of forest, were being washed away ; the uproar thus occasioned adding to the horrors of the storm.

The violence of the wind abated in the course of an hour, but the deluge of rain continued until about three o'clock in the morning ; the sky being lighted up by almost incessant flashes of pallid lightning, and the thunder pealing from side to side without interruption.

This November storm, in consequence of the moon-ring's meaning not being fully appreciated, might easily have resulted in the loss of the cuberta, with her crew and passengers. The vessel belonged to Penna, a trader of Obydos, who was taking it laden with merchandise to the Rio Negro.

III

Whympfer, in an account of one of his attempts on the Matterhorn, states that when they reached Breuil a halo round the moon promised "watery weather." They were not disappointed, in that on the following day rain fell heavily, and when the clouds lifted for a time they saw that new snow lay thickly over everything higher than 9000 ft.

In Tasmania there is a correspondent—Mr. H. Stuart Dove—to whom I am indebted for many valued communications. During the past autumn he wrote to me on the subject of lunar halos. In some seasons, he said, he had seen a number of fine examples of those phenomena, and his experience was that they were almost invariable precursors of wind and rain, although the halo was often 48, and sometimes even 60 hours ahead of the disturbance. An old friend of his, Mr. J. Whitham, with some 50 years' experience in England, Canada and Tasmania, had always found the halo to be "a most reliable prophet of change."

There is a belief, I find, that the number of stars enclosed within a moon-ring represents in some way the number of days the bad weather will continue. That, however, is not borne out by observation. It is evident that the visibility of the stars in the ring depends, in the first place, upon the prevailing state of the atmosphere, and, next, upon the moon's position in the sky. With regard to the latter condition, it must be obvious to most people that some regions of the heavens through which our satellite passes in its monthly round are much richer in bright stars than are

others. And it is only the brighter stars and planets that can be seen in the encircling halo.

Whilst I have always considered observations of lunar halos to be of value to meteorological science, they must be at the same time of value to those to whom weather changes are of high importance. I would instance farmers and seafarers. A Yorkshire agriculturist once told me that he had kept a diary of the weather over a period of forty years, noting the appearance of the sky every day and especially such phenomena as halos, either lunar or solar. He had found, he said, that certain sky indications were soon followed by the same type of weather, by which means he had been able to conduct his farming with a minimum of loss. I subsequently heard from a private source that the "minimum of loss" meant a comparatively large fortune to his credit at the bank.

#### IV

Has the corona—that rainbow-tinted ring round the moon—the same weather significance as the halo? My own experience teaches me that it is a sign of coming cold weather rather than wet or windy. Mr. Janney, whose observations of the lunar halo I have already given, informs me that he has come to look upon the corona as presaging fine and settled weather. He records one "of the most transcendent beauty" on December 6th, 1913, which formed "a broad band of pearly light next to the moon's image; then one of light blue, encircled by a further belt of orange-red, and an outside fringe of purple hue." Others were visible on January 7th and 15th, 1914, and were

“followed by a long continuation of fine weather, with only occasional high north or westerly winds to mar the tranquillity.” Mr. Dove, writing from West Devonport, Tasmania, says : “Here we do not expect disturbances after coronæ, only after the great halos.”

In Humboldt's *Personal Narrative* there is the following reference to these phenomena : “Coloured circles around the moon are much more rare in northern countries than in Provence, Italy, and Spain. They are seen particularly (and this fact is singular enough) when the sky is clear and the weather seems to be most fair and settled. Under the torrid zone beautiful prismatic colours appear almost every night, and even at the time of the greatest droughts ; often in the space of a few minutes they disappear several times, because, doubtless, the superior currents change the state of the floating vapours, by which the light is refracted. I sometimes even observed, between the fifteenth degree of latitude and the Equator, small halos around the planet Venus ; the purple, orange, and violet were distinctly perceived ; but I never saw any colours around Sirius, Canopus, or Achernar.”

The solar halo, with us in London, is an appearance of some rarity. What it implies in a weather sense is not at all certain ; I have known sunshine to follow one of them and storm to succeed another. Mr. Charles W. Marten, of Stoke Newington, has informed me that when at Filey, during the summer of 1914, an old fisherman remarked to him that he expected the weather to break up very shortly. Why ? he was asked. “Because I saw a wheel round the sun at break o' day,” he replied. Such an apparition, in the opinion of this Man of the Sea, always meant the

break-up of the summer weather. But that one did not, for it remained fine during several succeeding days. It may be assumed that what the Filey fisherman saw was a true solar halo.

## V

I will close this chapter with an old rhyme on the signs of foul weather :

The hollow winds begin to blow ;  
The clouds look black, the glass is low ;  
The soot falls down, the spaniels sleep ;  
And spiders from their cobwebs peep.

Last night the sun went pale to bed ;  
The moon in halos hid her head.  
The boding shepherd heaves a sigh,  
For, see, a rainbow spans the sky.

The walls are damp, the ditches smell,  
Closed is the pink-ey'd pimperl.  
Hark ! how the chairs and tables crack,  
Old Betty's joints are on the rack :  
Her corns with shooting pains torment her,  
And to her bed untimely sent her.

Loud quack the ducks, the sea-fowl cry,  
The distant hills are looking nigh.  
How restless are the snorting swine !  
The busy flies disturb the kine.

Low o'er the grass the swallow wings,  
The cricket, too, how sharp he sings !  
Puss on the hearth, with velvet paws,  
Sits wiping o'er her whisker'd jaws.

The smoke from chimneys right ascends,  
Then, spreading, back to earth it bends.  
The wind unsteady veers around,  
Or settling in the south is found.

Through the clear stream the fishes rise,  
And nimbly catch the incautious flies.  
The glow-worms num'rous, clear and bright,  
Illumed the dewy hill last night.

At dusk the squalid toad was seen,  
Like quadruped, stalk o'er the green.  
The whirling wind the dust obeys,  
And in the rapid eddy plays.

The frog has changed his yellow vest,  
And in a russet coat is drest.  
The sky is green, the air is still,  
The mellow blackbird's voice is shrill.

The dog, so alter'd in his taste,  
Quits mutton-bones, on grass to feast.  
Behold the rooks, how odd their flight,  
They imitate the gliding kite,  
And seem precipitate to fall,  
As if they felt the piercing ball.

The tender colts on baek do lie,  
Nor heed the traveller passing by.  
In fiery red the sun doth rise,  
Then wades through clouds to mount the skies.

'Twill surely rain, we see't with sorrow,  
No working in the fields to-morrow.

## CHAPTER XIV

### CATS AND THE WEATHER

Is the domestic cat so weatherwise as many people believe it to be? May not good weather be expected, say some folk, when pussy washes herself, or bad weather when she licks her coat the wrong way, or sits with her back to the fire?

Let but poor puss scamper wildly about the house, amid the infinite scoldings of the busy mistress, and she is said to have a "gale in her tail." And have not sailors a belief that ill-luck awaits them if the ship's cat frisks around more than usual?

Although I have always been very fond of cats, I must confess not to have observed anything weatherwise about them. One of my favourites of the feline tribe is named "Billy," which to its intimates is shortened to "Bill." Why it should be called "Billy," or even "Bill" is perhaps best known to those who gave it that name, for it is of the fair sex, though black as midnight.

Well, "Billy" is a cat of originality. Among her peculiarities is that of seeking admission to the house, after an evening stroll along the tops of the back garden walls, by vigorously rattling the handle of the basement door.

Recently, "Billy's" mistress—a lady born within

a hundred yards of Trafalgar Square—invited me to an ocular demonstration of the cat's alleged weather-wisdom. "Billy," it appears, had all that morning shown an irrepressible desire to get up the "cold" chimney. When made to desist, she had taken the first opportunity to repeat her strange conduct.

The demonstration was given and certainly proved one thing, namely, that "Billy's" eagerness to ascend the sooty interior of that "cold" chimney was still manifest. Shall I ever forget the proud, triumphant look of her mistress at this evidence of feline fore-showing! Every glance, every movement, expressed as plainly as words could utter: "There! did I not tell you so?" Surely, no one could be sceptical enough to doubt that a change of weather was coming.

Alas! just when some of us were becoming convinced that here we had a cat of extraordinary powers of prognostication, down from the chimney there fluttered, with many an alarmed cheep! cheep! a poor, wretched, grimy sparrow. . . .

No longer now is "Billy" looked upon as a feline phenomenon. That sparrow was her undoing. Word of the disillusionment soon spread. Even the cat's-meat-man with the meow-like call now passes the door without stopping. Only yesterday, "Billy" followed him the entire length of the street—which was an unusual thing for a London cat to do—but her plaintive cries utterly failed to soften his heart. It is not easy, indeed, for any pussy to soften the heart of a cat's meat-man. As he turned the corner of the street—where stands the church with the towering spire and the unilluminated clock a-nights—he whipped up his

shaggy little pony, and "Billy" slunk disconsolately away. The fellow, seeing her go, hissed after her the one scornful word, "Sparrers!"

## RAIN FROM THE SOUTH-EAST

Having referred to a belief held by many Londoners that it never rains in the capital without it raining at Brighton, and having stated that I should have thought that the likelihood of rain falling simultaneously would have been greater to the north than to the south of London, I am told by Mr. G. W. B. Macturk, C.E., of Hull, that he has frequently heard it said in the East Riding of Yorkshire that when bad weather occurs in London the East Riding gets it a day or two afterwards. Mr. Macturk shows that most of the rain in the East Riding comes from the south-west, but does not think that the less frequent south-east rains are so easily accounted for. These rains frequently start from the south-east after a long spell of dry weather.

May not those south-east rains in East Yorkshire be explained by the interaction of two air currents? Let us see how it works out by taking a specimen cyclone whose eastward or nor'-eastward track lies right across Yorkshire and the North Sea to Denmark. The cyclonic area is divided into, say, two equal parts, with the northern boundary in the Highlands of Scotland, and the southern in the English Channel. The centre is off the coast of Wales. Now, it will be found that the wind in the south-east quadrant (moving counter-clockwise, according to rule) is a south-west wind, and that it is warm and laden with moisture. It sweeps up, then, from the sou'-west until it reaches a

point out in the North Sea corresponding to the track of the cyclone.

At or near this point, however, the wind will be found to be easterly, and therefore dense and cold. It opposes the further progress of the light, warm, moist sou'-west wind like a solid wall. What is the sou'-wester to do? It mounts the cold obstacle as it would the side of a Yorkshire hill, and with the same result—condensation and precipitation. Hence there is rain from the east or south-east in the pleasant countryside of the East Riding. But much depends upon the position of the cyclone's centre. That, I take it, is why the east or south-east rains are comparatively infrequent.

## RED SUNSETS

What does a red sky in the evening really portend? Fine weather, most people would answer. And they would be supported in their belief by no end of proverbs and sayings. In Mr. Richard Inward's entertaining book on weather lore, for instance, we find this rhyme:

The evening red and the morning grey  
Are tokens of a bonny day.

That is of Scottish origin, but France, Italy and Germany have all the same idea.

And how often have I myself, when a boy at the seaside, repeated that

A red sky at night  
Is the sailor's delight.

Further, have we not in the Scripture: "When it is evening, ye say, It will be fair weather; for the sky is red."

There is, too, an old couplet which runs :

The skie being red at evening,  
Foreshews a faire and cleare morning.

Not always ; and the New Year-tide of 1915 was one of the occasions on which it did not.

Nothing delights me more than to put some of these hoary weather beliefs to the cold, calculating test of patient, unwearied observation. True, this particular test was confined to but a single evening ; it was, however, my first of the kind, and it was a revelation.

It was a New Year's Eve red sunset ; one of those glowing skies that attract the attention of even the most apathetic nature-lover. It enveloped half London in its fiery glow. When the light died down, the full moon appeared, ever increasing in brightness with the progress of the night. That was indeed promising for the red sunset.

Nine o'clock came. A filmy curtain of cirro-stratus cloud passed at a great height before the moon, and then—alas ! for that red sunset, thought I—there slowly became visible the blurred outline of a large halo. Well within the ring, a few degrees to the right of the moon, was the planet Saturn. The phenomenon persisted with more or less distinctness for half an hour, and when it disappeared the moon disappeared too. That was certainly not so promising for the sky of the " sailor's delight."

Was it to be fair weather or foul, then ; a halo or a red sunset sequel ?

Sunrise on New Year's Day was fiery ; of a suffused fieriness, not hanging folds of fire ; not even fiery stratus clouds. That was promising enough—for the halo.

The storm clouds began to arrive from the south at nine o'clock that morning and an hour and a half later rain was falling from a lowering sky filled with flying scud.

By noon it was raining faster than ever, and blowing hard. In short, it rained and blew all day. The halo won. But how deceptive that red sunset!

## THUNDER AND LIGHTNING

### I

In the late Spring of 1914, one Friday evening, there was a wonderfully brilliant display of lightning in London. I witnessed it throughout from the Stockwell side of Clapham Road. The lightning was visible in the west for fully an hour before the faintest rumble of thunder was heard. Several flashes, from my viewpoint, were exactly behind the spire of St. Michael's Church, Stockwell Park Road, and brought out the tall, tapering structure in weird relief against a dazzling background of steel-blue fire. Once, what seemed to be a large mass of globular lightning burst fairly behind the middle portion of the spire and produced the effect of the sun being blown to atoms and leaving black darkness behind. The greater number of the flashes were of the wriggling, vertical type, intensely vivid, and appearing in such quick succession as to keep the sky in a constant quiver of light. When the thunder had once started, it rolled continuously for half an hour on end.

It was astonishing to see the risks some people ran, only to escape unharmed. I saw several women

hurrying along the gleaming pavement with their umbrellas up, while the lightning enveloped them and all around them in a sheet of livid flame. As their deaths were not reported in the newspapers I can only assume that the fate which they courted did not overtake them, any more than it did a gay group of young girls who, I observed, had taken shelter under a tree a little distance away. At the storm's height—when, as near as I could tell, it was over Westminster—several cyclists rode past me with the lightning playing in malevolent gleams about them and their machines. The spectacle roused the greatest fears within me that the next flash would reveal so many inanimate bodies lying in the road amidst a tangle of fused and twisted metal. I have been indeed often tempted to ask myself if cyclists and motorists bear charmed lives out in a thunderstorm, so rarely do they seem to come to harm. Perhaps there is an element of luck in their immunity, just as there is in one's escape from measles, or lock-jaw, or blood-poisoning.

The last information I had of this severe storm was that it passed on to Woolwich. It was thus making for the mouth of the Thames. That was early on the following (Saturday) morning. Now, by noon of that day it had probably reached the entrance to the Straits of Dover. The unfortunate Hamel—, but I have no evidence before me of a thunderstorm in any part of the Straits or the Channel when that brilliant young airman was making what proved to be his fatal traverse.

I am reminded that Darwin suspected thunderstorms to be very common near the mouths of great rivers. In his *Researches* he points out how peculiarly

subject to electrical phenomena is the neighbourhood of the Rio Plata, and he quotes from Azara's *Voyage* to show that in the year 1793 "one of the most destructive thunderstorms perhaps on record" happened at Buenos Ayres, when thirty-seven places within the city were struck by lightning and nineteen people killed. He asks if it is not possible that the mixture of large bodies of fresh and salt water may disturb the electrical equilibrium.

On my putting the great naturalist's theory before Dr. W. N. Shaw, he said he thought it impossible either to confirm or deny it. He did not think that anyone knew what the electrical equilibrium at the mouth of a great river was, and that, of course, had to be settled before the question of the effect of mixtures of large bodies of fresh and salt water upon the equilibrium was considered. It seems that no statistics of the distribution of thunderstorms over the navigable seas are forthcoming. Those observers to whom Dr. Shaw had spoken were not prepared to risk any generalisation. The Doctor added: "I recollect that many years ago Sir Wm. Wharton, the hydrographer, who had spent a good deal of his life in surveying, spoke of the Straits of Magellan as being particularly affected with thunderstorms."

Darwin once inspected a house which had been struck by lightning at Monte Video. "The paper," he relates, "for nearly a foot on each side of the line where the bell-wires had run, was blackened. The metal had been fused, and although the room was about fifteen feet high, the globules, dropping on the chairs and furniture, had drilled in them a chain of minute holes. A part of the wall was shattered as if

by gunpowder, and the fragments had been blown off with a force sufficient to dent the wall on the opposite side of the room. The frame of a looking-glass was blackened, and the gilding must have been volatilised, for a smelling-bottle, which stood on the chimney-piece, was coated with bright metallic particles, which adhered as firmly as if they had been enamelled."

## II

It is estimated by Dr. George A. Carse that the rate of fatalities from thunderstorms in Hungary is 77 per ten millions of the population in a year, and in London one per ten millions. It seems that in Hungary fifteen fatalities occur under trees in proportion to 57 in the open, but, as Dr. Carse is careful to explain, "the relative numbers of people so exposed at times of danger are unknown."

That an isolated tree is much more likely to be struck than one in a wood is generally recognised, as is also the fact that different trees have different capacities for attracting lightning. Oak trees are very dangerous, for example, just as beech trees are particularly safe. The reason of this, I take it, is that the former are much moister than the latter, lightning having a decided weakness for moisture.

It has been estimated that the relative capacities of the oak and beech for attracting lightning is in the proportion of 57 to 1, though it is to be feared that the average person's knowledge of trees does not allow of him discriminating between an oak and a beech. And discrimination is less likely to be exercised when there is a sudden rush for shelter from the storm. To vary

the old saying, it is, I am afraid, only too often the case of any tree in a storm. I can conceive, say, a husband and wife in a moment of panic flying for shelter, the one under a beech tree and the other under an oak near by. The lightning falls with fatal effect on the oak ; one person is taken in the twinkling of an eye ; the other is left——.

### III

Not long after the above was written there occurred in South London a thunderstorm of unparalleled severity. It broke over the district with a suddenness that was remarkable and caught unawares thousands of people who had left home for what they intended to be a pleasant Sunday morning walk. Several persons (including some children) were struck dead while sheltering under trees on Wandsworth Common. One of the first men to whom I spoke on the following morning said : “ I spent a lively hour under a tree in that storm yesterday, but, thank heaven, the tree was a big one, and I was as dry as a bone.” On my expressing surprise that he should have escaped unharmed, he replied : “ Well, I would much rather have been there than have got wet through.”

On the Sunday before that terrible storm I was sitting indoors reading when there came a startling clap of thunder. The sky was not in the least thundery at the time. As a fact, the sun was shining, and a few snow-white clouds were lazily floating in the northern blue. It was but a single peal. There was no lightning ; nothing more, indeed, and the sun continued to shine until its setting. The experience was uncanny. Next

morning the secret was out ; there had been a terrific storm in Caterham Valley, twelve miles off, and that solitary clap of thunder was the only echo of it that came my way.

Thunder, it is generally admitted, is capable of being heard over a distance of eighteen miles. Mr. T. B. Blathwayt, of Cape Town, recently stated in *The English Mechanic* that he had heard it at that distance on the veld. And if I may digress a little I should like to record Mr. Blathwayt's experience in regard to the distance at which gun-fire can be heard. When at Lyme Regis, during the time of the 1897 Jubilee, he heard a continuous booming like distant thunder on the day of the great naval review at Spithead, and he has small doubt that it was caused by the guns, some 80 miles away. Mr. Blathwayt believes that in anticyclonic conditions sound would travel farther, "as owing to the descending currents the sound-waves would be more concentrated and reinforced than if the wind were ascending and dispersing them into space." A Swedish observer, too, notes that the bombarding of Libau, during the early period of the present World War, was perfectly well heard on the east coast of his island of Gottland. The detonations were so loud at times as to make the windows of the houses facing the shore rattle again. He places the distance from Libau to Gottland at one hundred miles. I am aware that there are many instances on record of the sound of guns having carried to much greater distances than those I have mentioned. I give the above more as interesting contributions to the existing records than as anything extraordinary in themselves.

## IV

To return to the subject of thunderstorms, the distressing fatalities on Wandsworth Common that terrible Sunday morning produced a flood of advice as to how to act when overtaken in the open by an electric storm. One writer who suggested that it would be on the whole best to "sit or lie down in an open spot," wished no doubt to convey a warning against hurrying through the storm. And very properly so, for by walking rapidly or running, a disturbance of the air is created, which in itself tends to attract the lightning. The draught which such a motion causes is just what should be avoided, for we know how readily lightning will enter an open door or an open window. A few years ago, in a northern city, a man told me that during a very violent thunderstorm all the windows of his club were thrown wide open. I asked him if that was to let in the lightning. "No, not exactly; rather to let it out again if it did get in," he replied. The lightning accepted the invitation to enter the club, and though it magnanimously spared the members, it pierced a thick wall and smashed the back of a large safe in an adjoining room. To this day the members of that club are puzzled to know how the lightning knew the safe was there.

## V

On March 8th, 1915, I received from Prof. Chas. Clifford Conroy, of Los Angeles, California, a communication so readable and informative as to make, I hope, an apology unnecessary for my giving it in

full: "Thunderstorms are infrequent on the Pacific coast of Canada and the States. At Los Angeles, latitude 34 degrees N., the maximum number of thunder-days in a single year was 8, in 1905. Last year (1914) there was but one. As the winter season is the wet season, thunderstorms are more likely to occur in winter than in summer, especially in California, though this is true only of the immediate coast-strip. Back in the mountains and on the desert, thunderstorms of local character are not unusual in summer. It should be remarked that, on or near the coast, electrical storms (if, indeed, they merit the title 'storms') are very mild in character, and seldom do any damage. Still, one reads occasionally of injury from lightning. In December, 1913, the flagstaff on a banking-house in San Francisco was struck and splintered, and only a week ago (February 10th, 1915) one Antonio Maldonado, a Mexican, was killed by a 'bolt' near Chino, some sixty miles east of Los Angeles. The newspaper despatch may be interesting, as showing the rarity of death from lightning in California: 'This is the first time that anyone has been struck by lightning during a storm in the low country, as far as anyone here can remember. Some years ago a man was struck in the mountains near Redlands, and there have been cases of lightning striking in other parts of the mountains, but no fatality has been recorded. It is an occurrence of years for lightning to strike at all in the broad San Bernardino Valley.' Man's memory is proverbially short in respect of the weather," continued Prof. Conroy, "and this quotation is no exception. Lightning strikes oftener than it would indicate; but not

often enough to call the event anything but an unusual one.

“ When lightning occurs in winter it is either in the south-west quadrant of an area of low pressure, or along the line separating vaguely the boundaries of a diffused ‘ low ’ moving eastward, and an incoming ‘ high ’ from the Pacific. In my twenty-two years’ residence here I have noted about 65 days on which lightning and thunder have occurred, though the number would easily be doubted 10 or 12 miles to the north or east. I do not now recall a single storm in which there were as many as 25 peals of thunder ; and for the most of them 12 would be the average maximum. The occasional thunder showers that visit the lands near the coast in summer are northern extensions of Mexican storms, locally known as ‘ Sonoras.’ Near the Mexican line they are sometimes of moderate severity, but never so far north as Los Angeles. The last one of any considerable and general precipitation occurred August 9th, 1908. The rainfall at Los Angeles was .08 inch, and at San Diego 0.61 inch. I may remark that this was the last *measurable* rainfall recorded in Los Angeles in the month of August. March shows the maximum number of thunder-days for a given period. In that from 1901 to 1910 (ten years) there were seven days with lightning and thunder in March.”

## CHAPTER XV

### MISTAKES CONCERNING METEORS

A FEW informal manuscript notes on this matter were sent to me in July, 1914, by Mr. W. F. Denning, of Bishopston, Bristol, our leading authority on meteoric science. "Many people hear, or fancy they hear," he said, "hissing sounds accompanying meteors in their flight. In certain cases the observer has stated that, hearing a curious hissing sound, he looked upwards to ascertain the cause, and then recognised the meteor." This does indeed seem remarkable, inasmuch as sound in ordinary air travels, he says, only about  $12\frac{1}{2}$  miles in a minute. If the meteor did emit any sound, the noise would be heard, probably, in three or four minutes at the soonest. Yet it has often astonished Mr. Denning to find how many people will swear to having heard this hissing sound. It is one of the greatest and most frequently repeated misconceptions concerning meteors. I have not the slightest doubt, however, that the observers were honestly deceived. It is easy to be tricked by one's own imagination. That is even more evident in the case of those observers who fancy that the meteor they have just seen has emitted a sulphurous odour. This odour, however, must have travelled in some instances at the rate of about fifty miles a second from

the meteor to the observer if it was really produced by the meteor.

Large meteors, like brilliant planets, always seem much nearer than they really are. "People," said Mr. Denning, "often describe them as falling 200 or 300 yards away, or just on the other side of a park or of houses near them. One observer stated that he saw a big meteor coming straight towards him and that he ducked his head just in time to allow of the object passing over him. It fell on the other side of the hedge near which the observer was walking, according to his statement." The most positive assertions are frequently made that a meteor was only a few hundred yards away when it was actually from 100 to 150 miles off. It is not, it seems, an uncommon circumstance for people to imagine they have heard, as a big meteor exploded, the patter of the dust and fragments into trees near them. Of course, the imagination is there again at fault; in one case where the dusty débris was alleged to have been very distinctly heard, the object was 175 miles distant.

Sometimes the error is purely visual. There was an observer who would persist in describing the Perseids as having their flights all directed *towards* the radiant. And the odd part of it is that Mr. Denning never succeeded in convincing his correspondent that the Perseids—in common with other meteor showers—moved away from the radiant.

## STONE-FALLS FROM THE SKY

This is a subject to which Mr. W. H. S. Monck, of Dublin, has given special attention. Dealing with it

in its most interesting aspect in a quite recent communication to me, he says he believes that planets, asteroids, comets and meteors, whether original members of the Solar System or received into it by capture, are all moving round the sun in ellipses, parabolas, or hyperbolas, but much the greater part in ellipses, and therefore with periodic returns, though some of the ellipses are very elongated, and the corresponding periods very long. "When a body thus travelling is of small size and enters the atmosphere with the high velocity due to its orbit, it becomes red-hot from the heat developed by the friction, then white-hot, then it melts, and finally it vaporises and disappears by getting mingled with the air. It is not burned."

Different meteors enter the air with different velocities. As Mr. Monck says: "One with a retrograde orbit will be going faster than one with a direct orbit, and one of long period than one of short. Where an initial velocity of 40 miles per second would lead to the dissipation of the meteor at the height of, say, 25 miles, the same meteor, if entering with a velocity of 10 miles per second, might escape complete dissipation and drop on the earth an unmelted core." The Leonids and Perseids have high velocities and consequently do not produce aerolites or meteorites. Mr. Monck contends that most feeble showers may give rise to aerolites if they enter the atmosphere with much diminished speed. He points out that Prof. Newton, from an investigation of the narratives of stone-falls, concluded that in the majority of cases they were travelling in ellipses with direct motion and small inclination to the ecliptic—"like miniature

asteroids." Mr. Monck assisted the late Mr. Harvey in compiling a table of these stone-falls for the Royal Astronomical Society of Canada in the year 1903, arranging them according to the time of year they fell, and he thinks that the tendency to grouping was sufficiently obvious. The recurrence of the falls at the same date after one year or two years was, he believes, more marked than the indications of longer periods.

Taking the month of May, which is the most prolific of the year in stone-falls, Mr. Monck found one on May 8th, 1829, and one on the 9th in the years 1827, 1894 and 1895; one on May 14th, 1861, and another in 1864; one on the 17th in 1877, and another in 1879; one on the 20th in 1874, and another on the 21st in 1871; one on the 22nd in 1868, and another in 1869; one on the 24th in 1892, on the 26th in 1893, on the 27th in 1866 and 1895, and on May 30th, 1866. As the total number of stone-falls does not much exceed 300, these figures are with reason looked upon by Mr. Monck as remarkable. "I think," he concludes, "that these aerolites are of the same nature as ordinary meteors, and that they escape dissipation in the air owing to their slower motion, and possibly their larger size. They probably travel in swarms or clouds, but not so dense as some of the other meteor showers which fail to produce aerolites owing to their velocity. The individual aerolite may perhaps be regarded as a very small asteroid."

So far as ordinary meteors are concerned, the second half of the year is richer in them than the first, a fact which is thus explained by the Rev. M. Davidson, F.R.A.S., Director of the British Astronomical

Association Meteor Section: "If we think of the direction in which the axis of the earth is inclined, we have a simple physical explanation. From summer to winter solstice the orbital motion of the earth is such that the northern hemisphere must encounter more meteors, and from winter to summer solstice it must encounter fewer. On the southern hemisphere the maximum number will be encountered when the fall on the northern hemisphere is at its minimum, and vice versa."

### NOTES ON COMETS

In the early stages of the World War a comet (Delavan's) became conspicuously visible with the naked eye. A number of correspondents made inquiries respecting it at the time it was passing under the stars of the Plough. One of them—Mr. J. Timmis, of Warrington—stated that on seeing something which he took to be a comet he called his companion's attention to the object, when the latter declared it to be "a star with a tail." Mr. Timmis sent me a sketch of the object and its surroundings, and this showed the correct position of Delavan's Comet, which was then nearly in a line with the stars of Megrez and Phecda, or Delta and Gamma Ursæ Majoris.

It was at much about that time I obtained my first naked-eye view of the comet. In a way, it was an accidental view. A motor fire-engine had dashed past me (as only a London motor fire-engine can dash past one) and I glanced in the direction it took in order to see if the glare of the outbreak was visible. The direction happened to be due north, and instead of a fire glow on the horizon I saw, right across London,

Delavan's Comet, so bright that it was impossible to miss it.

The last observations of this comet in England, Dr. Crommelin believes, were those obtained by Mr. R. L. Waterfield, of Cheltenham, at about six o'clock on the mornings of January 16th and 18th, 1915. It was seen low down in fairly bright twilight, eleven minutes of arc south of Eta Ophiuchi on January 16th, and nearly one degree south of that star on January 18th. The tail was about ten minutes of arc in length, and pointed north-west. In a photograph taken by Mr. F. W. Longbottom, of Chester, the comet at one time showed a tail traceable for at least 8 degrees.

The experience of my correspondents in finding what was to them a mysterious object in the heavens recalls to my mind similar inquiries relating to the Morehouse Comet, also Borrelly's and Brooks'. In regard to the last-mentioned, I recollect that Mr. Chas. Crump, of Harrowden, Wellingborough, wrote to me during the autumn of 1911 asking for the name of the celestial visitor he had seen in the morning sky, a little to the left of and below "the very conspicuous planet" (Venus) which was just then so striking an object. Brooks' Comet, which Mr. Crump had seen, had been watched with much interest every clear evening for some time previously as it journeyed towards the sun.

Encke's Comet, according to a note received from Dr. Crommelin, was very brilliant as a telescopic object in November, 1914. The late Mr. Lynn's prediction that it would be seen no more has not, therefore, been verified. When Mr. Lynn expressed

his fears to me concerning the dissolution of this modest little body, I remember having, in deploring its loss, suggested that it might after all reappear in the form of a meteor shower, perchance to become known as the Enckids. There is the example furnished by Biela's lost comet and the Bielids. It seems, however, that if Encke's should at any time lose the form of a comet we shall lose it altogether, for Dr. Crommelin points out that its orbit is too distant from the earth to give us any meteors.

## CHAPTER XVI

### THE STORM'S TRIUMPH

#### I

IT was early one mid-December Sunday that the French clipper-built barque *Français* appeared off Hartlepool.

Wild weather had prevailed during the night. It had been a night filled with the hoarse clamour of the gale sweeping over the quaking peninsula ; a night, too, of black darkness and streaming rain and flying tattered clouds ; a night of driving sea-spray and foam. And the foam had eddied wildly down into the streets of the little port, leaving yellow quivering tracks on their deserted pavements and rattling windows. The lifeboats had been ready all night, riding on the troubled waters of the harbour in readiness for the signal. They had lain side by side with a snorting tug, which was prepared at a moment's notice to drag them through the bay on their errand of mercy, or to dart out alone to succour any craft in evident distress.

When the *Français* was revealed by the dawn she was only a mile from the Moor cliff, hove to under close-reefed topsails. Those who first descried her wondered how she managed to carry even that amount of canvas in such a wind and sea. It was clear that

she was trying to ascertain her position, and indeed she began to beat northward while the watchers on the Heugh Lighthouse kept her in their eye. It was afterwards learned that she was bound for the Tyne, in ballast, from Caen. The French skipper in trying to make the Tyne had a tremendous task before him in such a heavy in-shore gale. The sea which he shipped over his weather bow as he brought the barque round was a rude reminder of the difficulties that lay ahead of him. Only the supremest confidence in his vessel and in his own seamanship could have led him to essay the attempt at all, as even the least nautical of readers will perceive for himself by a glance at the conformation of the coast. But who now blames him for the initial error? Who remembers aught save the superb sailorly skill which he showed throughout that memorable Sunday!

The news that the *Français* was in the offing spread through the port like wildfire, and soon the Moor cliff hummed with people. Thenceforward, they followed and criticised every manœuvre of the vessel, undeterred by either the biting cold or the fiercest of the rain and sleet squalls, which at times completely blotted out the ship and the sea and the hills south of Hartlepool Bay.

The *Français* succeeded in beating as far north as the sinister Blackhall Rocks, a few miles up the coast, and then she put about to the southward again. This manœuvre was clearly observed from the Moor. Its significance made all hearts beat faster, for it told us in unmistakable language that the *Français* was embayed. The struggle for supremacy between the ship and the storm had begun.

Then the rocket apparatus was brought out, and the little snorting tug was seen rounding the headland, with the smoke from its funnel blowing shoreward in hard, horizontal lines. Just at that moment we heard the bells of St. Mary's ring out in wild cadence on the storm. Could the crew of the battling ship have heard, one can conceive how they would have welcomed those bells as messengers of hope, for at that time the *Français* was undoubtedly in danger.

The tug reached her . . . ; the tugmen were ready to heave a line on board ; but the Frenchman was obdurate, and his crew stood motionless aft. We saw the tug at great risk, however, stand to the southward in close company with the barque.

When the *Français* had got abreast of the Moor Battery she had been blown in quite close to the rocks. Heaven knows, her benumbed crew just then must have needed every finger God had given them. To starboard there was a leaping, rushing, roaring fringe of snow-white breakers ; to port were towering, curling, livid, froth-tipped seas, and the pouring gale. Dead ahead was the cauldron which marked the position of the submerged Heugh reef, running out from the base of the lighthouse protection wall, at the point of the headland. The *Français* had to cross this reef, or to strike upon it and be pounded to matchwood.

I heard a low murmur of suspense pass through the compact mass of spectators who leaned against the wind and sleet on the shuddering cliff. Then every tongue gave fearful pause. Even the Storm Fiend itself seemed to stay its tumult, and the screaming gulls their complainings.

At the vessel's helm stood the brave skipper. Had he so minded he could easily have distinguished the separate details of the dark fringe of humanity on the cliff top ; but he looked neither to the right nor to the left ; what lay ahead was his sole concern. His crew were clustered aft, all in glistening oilskins. One of the courageous little group—he appeared to be but a boy—waved his hand to us ashore and we sent back a great heartening cheer. I could not truthfully say that all of us in the crowd were dry-eyed just then.

As the barque neared the reef she was forced absolutely to the edge of the breakers—a dreadful winding-sheet of surf. But so superbly was she handled that not a sail of her lifted.

Everyone was nigh choking with emotion when she plunged into the creamy cauldron on the reef, and when her hull was buried from sight there arose from the crowd a long-drawn, agonised “ Oh ! ”

“ She's lost, she's lost ! ” cried a huddle of people near me, and at this several women shrieked hysterically. Some, indeed, had to be removed from the scene in a state of collapse.

But the *Français* was not lost ; the storm was not triumphant yet. She rose out of the hurly-burly with that dignity befitting a truly gallant ship, and proudly, disdainfully, indeed, shook herself free of the superincumbent water. And even as she did so, a mountainous sea rushed at her and flung her bodily over the reef into the wide mouth of Hartlepool Bay. Some of the spectators wept silently for joy ; others gave vent to wild hurrahs. But how the breakers seethed and hissed, and how the wind shrieked with passion at the escape of its prey !

Never had such brilliant seamanship been witnessed before by any watcher on that storm-swept cliff that day. So close in had the *Français* been that it is always said she actually touched the rocks.

II

In the town, sparse congregations were at Divine Service. And how feelingly did they sing the supplication :

O, hear us when we cry to Thee  
For those in peril on the sea !

Others of the townspeople zigzagged against the wind to the cliff, shouting excitedly for information of the ship as they went. The more timid of the women, and the less robust, remained indoors,

Around the radiant fireplace, enclosed  
In a tumultuous privacy of storm,

or contented themselves with peering out into the wet, resounding streets, perchance to espy some passing friend freshly come from the scene of the Frenchman's titanic struggle.

Noon came ; the churches emptied themselves, but still the *Français'* skipper fought manfully with the gale. He had weathered the headland by his eyelids, so to speak, and now his manœuvres had to be confined to the seven or eight mile stretch of water between that point and the North Cleveland coast, skirting the south margin of the bay.

It was an intensely thrilling spectacle, this battle between man and nature, and the spectators, who had now gravitated from the north, or Moor side, of

the headland, to the south side, were wild with excitement. For as the Frenchman's sea-room grew more constricted, so did his efforts to escape become the more desperate. The *Français* was like some huge bird of the ocean tacking to and fro to find a breach in the barrier of the pouring blast. Swiftly sailing backward and forward, she created a feeling of alarm all round that part of the coast. After having stood across the mouth of the bay to the southward she fetched up in admirable style for about Redcar, where she caused the greatest consternation. The people of that little Cleveland town scarce dared to hope that, with the wind and tide and strong indraught into the Tees, she could escape being driven on to their dangerous rocks. So the lifeboats and rocket apparatus were got ready to render her assistance.

But by a master-stroke of seamanship her skipper wore her round, and, to the astonishment of all at Hartlepool who could clearly perceive the manœuvre, stood once more to the northward. Her progress in that direction, however, was soon stopped. The combined opposition of the wind and tide was obviously too powerful for her, and soon she was again standing to the southward. Not even her skipper's brilliant handling of her could avail, and it was with sinking hearts that the spectators, who were now gathered right round the shores of the bay, saw the *Français* fast losing ground. On this occasion, indeed, she went so near to Redcar rocks that the horses were attached to one of the lifeboats.

Truly must this clipper-built barque have had a charmed existence, for again she wore, clearing the rocks by an almost imperceptible distance. This was

a feat of seamanship even more dazzling than the previous one, but when the *Français* re-stood across the bay to the northward it was for the last time.

### III

The short December day declined. The air grew murky over land and sea. The sky became more leaden and the scudding clouds more inky. Ocean's voice, too, seemed to grow deeper, booming above all the other storm voices. Was there already a song of savage triumph in its majestic notes ?

For now the ocean bird fluttered, baffled. And what feelings must have arisen in the breast of that undaunted skipper as he began to realise the hopelessness of his self-imposed task ! Was it to be the Longscar Reef after all ? Many a gallant ship has gone to its doom on cruel Longscar, in the bend of Hartlepool Bay.

A fearfully cross sea was running off the Tees, and amidst it all the Frenchman encountered the brig *Remembrance* entering the river. The English captain hailed him and waved to him to follow, for, as he subsequently declared, it seemed that if it were not the Tees for the *Français*, it was Longscar or Seaton Snook.

The French skipper had been striving all day to beat out to sea and had several times come within his own ship's length of destruction. Moreover, he and his men had undergone the greatest hardships. What pangs, therefore, must it have cost him when, his iron resolve relaxing, he put up his helm and fell off in the brig's wake ! I have sometimes wondered since if he

did this out of consideration for his gallant crew, or because of his wife and children, perhaps, at old-world Caen, or St. Malo.

But, alas! he quickly changed his mind; round went the *Français* to the wind again. To this day his action has seemed inexplicable to me. His indecision nearly brought about his immediate undoing, for he cleared the Longscar Reef by so narrow a margin as to impress hundreds of persons with the belief that he had struck. The Seaton Carew lifeboat was ready horsed and the rocket apparatus down on the beach, so certain was everyone there that the barque would not clear the reef.

And now the weary ship sought a haven of rest. Through the deepening gloom it was observed that she had hoisted a flag for a pilot. Earlier in the day two steamers had each been provided with one, the men having been dragged from the tug through the water. But the sea was running too high for one to be put on board the *Français*. A tug, however, managed to take her in tow, when she was labouring heavily about a quarter of a mile from the West Hartlepool piers.

## IV

Thereafter, an unkind fate pursued the beaten, baffled barque. I have indeed frequently heard it said that a judgment fell upon her for her master's persistent defiance of the forces of nature.

The tug which had hold of the *Français* had come out of Hartlepool, and thither it attempted to tow her. All went well for a while, and then in the fast gathering darkness and through the storm-mist on

the water the vessel was seen to give a wild sheer and gradually to approach the shore. Soon, she struck on Middleton Beach ; the hawser had parted. There had been but twenty fathoms of it.

This was, in truth, an inglorious ending to a sea-combat the like of which had never before been witnessed on that part of the coast, and the grief among those who had watched the beautiful manœuvring of the barque all day was most poignant. They consoled themselves, however, with the thought that she was safe enough on the smooth sandy beach, as there had never been loss of life upon it in the memory of the oldest inhabitant.

They were certainly unprepared for what happened. No one expected that a tug would get a rope aboard and drag at her in such a way as to quite prevent her being driven up the beach and left high and dry by the receding tide, when the crew, judging from past experience, could have stepped ashore. Yet that is what was done. Nay, more ; she was kept broadside to the stroke of the seas.

On darkness falling the tug relinquished her efforts and the lifeboats drew in towards the vessel. There were two of them at first, then three, but as each essayed to get near the barque it was beaten back by the great recoiling waves from the West Hartlepool pier. One lifeboat was struck by a big sea which broke four of its oars and injured two of the crew, whereupon the other boats pulled clear. The damaged boat refitted in port and returned to the vessel, but was washed on to the beach. Then, so far as the lifeboats were concerned, the *Français* was left to her fate. The brave fellows in them could do no more.

When the spray-drenched spectators were beginning to realise that the French crew were decidedly in jeopardy, the rocket apparatus arrived from Hartlepool. It had been brought nearly three miles in the dark in about twenty-five minutes. The stand could not be set up without difficulty owing to the pressure of the crowd, for the beach was black with people.

There was much excitement as the first rocket sped out seaward on its message of hope. It missed, and a wail of despair rose from the crowd. A second was fired. It went fairly between her fore and main masts. In the darkness following the glare of the rocket there was some uncertainty as to whether the crew were making shift to use the line. No response came from the barque. Was it ignorance on the Frenchmen's part, or were they battered into helplessness by the waves, or paralysed by the icy showers that still swept at intervals from over the sea? These were some of the questions that the anxious watchers on shore asked one another in voices hoarse with misgiving. Some men, indeed, wildly shouted to the Frenchmen—in English—telling them what they had to do with the rocket line, but they might as well have yelled across to Norway for aught the shipwrecked sailors could hear in the din of the gale.

After an interval of a few minutes, during which everybody on the beach seemed to be talking at once, a third rocket was fired; then a fourth. When the lurid light of the last clearly revealed the *Français*, a simultaneous cry of horror rose all along the shore, for it was seen that she had fallen over on to her beam ends, decks to seaward, and that the crew were clinging to the sides, while the boiling breakers dashed over

them in cataracts. It was a moving scene, one that fixed itself for ever on the minds of those who witnessed it.

v

The end came quickly. Ere the last long wailing cry had come inshore with the wind the spectators knew that there remained of the once smart *Français* merely such fragments as those tossed by the surf at their feet.

A youth only was saved out of the nine souls on board. The oilskin-clad body of another young sailor came ashore in the midst of a great raffle of wreckage. It was the lad who had waved his last adieu off the Moor.

Not long after the final scene the skipper was thrown up on to the beach. There were many willing hands to seize him and carry him beyond the run of the surf. They laid him down and raised his head, whereupon he slowly opened his eyes as though to look the gratitude he could not utter and fell back dead. Thus with the wind and sea raging about him the brave spirit passed calmly to that

. . . silent shore,  
Where billows never break nor tempests roar.

The triumph of the storm was complete. But what a merciless triumph!

## CHAPTER XVII

### THE NAKED-EYE VISIBILITY OF JUPITER'S SATELLITES

THOUGH I have myself never succeeded in seeing any of Jupiter's satellites without optical aid, I do not forget that Mr. C. T. Whitmell once remarked upon there being evidence, "which cannot well be set aside, that the satellites are occasionally visible with the naked eye." Before me are details of an observation made by the late Mr. H. C. Levander and two of his pupils. They were supplied to Mr. Whitmell by Mr. Levander's brother. On April 21st, 1859, at Devizes, shortly after 8 p.m. (and about twenty minutes before the appearance of a splendid aurora), they saw two of the satellites distinctly, but as the sky became darker and the planet brighter, the satellites gradually disappeared. They then verified the observation by means of a telescope, and found that they had seen III and IV, which were to the right of the planet, IV being the more distant. Satellites I and II were in transit at the time. Mr. Whitmell's remarks upon the observation are valuable : "Opposition had occurred on December 8th, 1858, so that on the given date Jupiter was at a considerable distance from the earth. The declination of the planet was 22 degrees 50 minutes N., the altitude

about 30 degrees, and the azimuth about west. There was no moon, and twilight was faint. As III could not be more than about four minutes away from the planet's limb, I think that probably III and IV were seen as one object."

This observation strikes me as being a very suggestive one, because of its having been made just before a fine auroral display. May not the two circumstances be co-related, in that the auroral or electrified state of the upper atmosphere may have resulted in some exaltation of the light of the satellites seen by Mr. Levander and his pupils? There are instances, I believe, of the light of comets and even of nebulae having been apparently so exalted by such atmospheric conditions.

Mr. Charles Lewis Brook, of Meltham, Huddersfield, has stated that on May 6th, 1896, at about 9.45 p.m., he saw Satellite III at its western elongation. There was no moon, but Mr. Whitmell thinks that probably the last remnant of twilight was present. The satellites and planet were arranged from east to west thus: IV, I, II, Planet, III. Jupiter was in opposition on January 24th, and about the date of the observation was distant from the earth about 5.4891 units, and was in declination about 20 degrees 26 minutes N. The altitude was about 30 degrees. The evening in this case was a very clear one. Mercury had been easily visible until its setting. Satellite III would be about four minutes away from Jupiter's limb at maximum elongation.

Mr. Walter Parsons, of Horsforth, Leeds, also supplied Mr. Whitmell with the details of a naked-eye observation of a Jovian satellite. This was made in

September or October, 1903, at between 8 and 9 p.m. The sky was clear and the moon was shining not far from and to the east of the planet. He believed that the satellite was III. Mr. Parsons, whom I personally know to possess unusually keen sight, is now the esteemed Principal of the new Headingley Training College, Leeds.

## GUN-FIRE AND RAIN

### I

Does gun-firing cause heavy rain? A great many people believe that it does. On the other hand, a great many people believe that it does not. Appropriately enough, as I write, rain is falling in my district for the first time for I don't know how long, and the big guns are growling down Woolwich way. Of course, I suggest no inter-relation; I merely state what is actually happening, namely, that there is gun-firing down the river and that rain is simultaneously falling. It may or may not be worth mentioning, but I have frequently heard heavy gun-firing from the direction of Woolwich when not a drop of rain has fallen.

In the spring of 1911 the then First Lord of the Admiralty was asked by Lord Dalrymple whether he could arrange for the Fleet to carry out their heavy gun-firing practice round the coast at some other period of the year than the middle of harvest-time, "when the resultant heavy rain might cause serious loss to the farming community." The First Lord replied: "There is no evidence that the firing causes heavy rain. The winter months are unsuited for target

practice owing to bad weather, and the summer is generally devoted to manœuvres, so that the spring and autumn are the more suitable periods for target practice." A picture, I remember, of the Fleet at Spithead firing a salute at noon on Coronation Day, 1911, had an announcement affixed to it that "the thunderous discharge had the effect of bringing down the rain." A correspondent recently wrote from the north to tell me that in his forty years' practical experience of gun-firing he had never known a heavy discharge to fail in bringing down the rain.

There occurs in the diary of an Essex farmer, the following: "If I could make the weather I would have a soaking wet time every Saturday night during the summer, and if the rain continued on into the Sunday for a considerable time I could regard it through a window with perfect equanimity. I wonder how it is that all those people who work with explosive rain-balloons and hailstorm-guns, and inventions of that sort, have not yet been able to give us a shower when we need it. Yesterday there was a tremendous cannonading at Shoeburyness for an hour or two, and as it is only some ten miles away as the crow flies, our windows shake and rattle as if it were an earthquake, but yet it does not bring rain, and the glass is rising."

Those last few words may explain everything. When the barometer shows that rain need not be expected, perhaps not all the cannonading in the world will produce it. On the other hand, when the glass is sinking and there are indications of rain (I am associating the two in a broad sense only), it may be that a violent disturbance of the air, such as heavy

gun-firing would induce, would so interfere with the nice balancing of the clouds as to cause them to precipitate.

It is, I know, often advanced in support of the gun-firing and rain theory that torrential downpours marked the Waterloo series of battles. But I think we should remember that those engagements were fought in the middle of June, at a period when drenching rains may be expected in Belgium, battle or no battle. I have seen it seriously suggested, even, that the great storm which shattered the Spanish Armada was due to the heavy gun-firing during the engagement.

## II

Dr. W. N. Shaw favoured me with his views on the whole of this interesting question of the supposed effect of gun-firing upon the weather. He said :

“The suggestion that it is possible to influence the weather by bombardment is an old one. In countries where stress of weather is felt in the form of drought, the process has been put forward as a means of inducing rainfall ; in others, where serious damage is done by hailstorms, the power of inducing the clouds to shed their moisture in the form of rain is claimed for it ; and more recently it has been advocated as a means of dispelling fog. Experiments having for their object the production of rain by explosion have been carried out extensively, particularly in America and Australia, where Government and private persons have supplied the necessary funds. An account of experiments made in August, 1907, at Oamaru, New Zealand, has been printed by order of the New Zealand House of

Representatives, which shows that three extensive sets of experiments were made, but that in no case could any interference with natural phenomena be traced. If rain fell, it fell over an area of many thousands of square miles, in consequence of the passage of a cyclonic depression, and it was not specially near the scene of the experiments. The general conclusion arrived at is that the experiments afforded no evidence that precipitation was induced or in any way influenced by the explosions.

“A series of experiments on ‘weather-shooting’ was made in Austria and Italy. It was made as a result of an agitation by wine growers and others anxious for the safety of their crops. The experiments were of a most exhaustive description. There was a good deal of inconclusive discussion in the Press, followed by an International Conference of experts at the invitation of the Austrian Government. This Conference was held at Graz in 1902, and the conclusion arrived at was that there was probably no effect attributable to the shooting, but the evidence was not sufficiently clear to justify the categorical statement that the ineffectiveness had been proved. Consequently, further trials, under careful conditions, were made in Austria and in Italy, under Government Commissioners. The immediate object in view was the prevention of hailstorms, but the experiments actually amounted to an exhaustive test of the efficiency of ‘weather-shooting’ generally. The Director of the Austrian Meteorological Office, who had taken an active part throughout the investigation, declared that the matter was disposed of, not only among scientific men, but also among all objectively-minded

persons among agriculturists. The ineffectiveness of rockets and bombs, as demonstrated by the Italian experiments, entitled them to say: 'Hereby the end of weather-shooting is sealed.' The Austrian meteorologist added: 'No doubt the future will yet seek salvation in weather-shooting in spite of all and everything; but science is entitled to leave them to their imaginings.' "

## III

On the general question of concussion and rain, Dr. Shaw said: "The notion that concussion might affect rainfall goes back at least to the Middle Ages, when the ringing of church bells was thought to be effective. Upon the introduction of firearms these were brought in as an aid to controlling the weather, sometimes with the addition of pellets made of the remains of candles preserved from the celebration of Candlemas. As new methods of producing concussion are developed, the older ones are disregarded. The power of the church bell is now transferred to heavy ordnance. So far as experience goes, then, it can only be said that there is no evidence either of a practical or theoretical nature that heavy ordnance is more effective than a church bell, or that either has the smallest effect upon clouds or rainfall.

"We can easily detect the effect of the smoke of London and other great cities in intercepting a good deal of sunshine, but we cannot say that even that affects the amount of rainfall. Our incredulity as regards the influence of causation does not arise from unwillingness to consider evidence. It is singular to observe how some southern countries are periodically

smitten with the craze for 'weather-shooting.' Experiments are continued for a few years perhaps, but they only prove that the idea of affecting the weather by the discharge of guns is an exploded one. The agitation dies down—until the next time. Its reappearance is often due to the invention of some new apparatus, which, of course, is no more effective than any of its predecessors."

So much for the purely experimental side of the subject. On the theoretical side it should be remembered that the energy involved in producing rainfall is enormous. The heat liberated in the condensation of a rainfall of one-tenth of an inch over an area of one square mile, the Doctor pointed out, is the equivalent of the energy that would be produced by an engine of ten million horse-power in half an hour, compared with which expenditure of power the energy expended in the heaviest cannonade that man can produce must be puny. "We could only expect an effect if the atmosphere were in a state resembling that of a loaded gun, and the explosion provided the analogy of pulling the trigger." But, as Dr. Shaw remarked, there are no grounds for supposing that the atmosphere is in a state of unstable equilibrium such as is demanded by this suggestion. The only instances where we have any evidence of instability are those afforded by violent thunder-squalls. "But even then we have no reason for supposing that we could influence the course of the phenomena by explosives."

## IV

An American authority, I am told by Mr. M. H. Ilsley, has said that a favourite argument was that

rain was caused by the agitation of the particles of the atmosphere resulting from the concussion after firing, and that to carry this to its logical conclusion would mean that to clap one's hands in the steam from a kettle would cause a miniature shower. Mr. Ilsley remarked that personally he should have thought a shower more likely in the latter case, as the disturbance would be relatively greater. In Russell's *Meteorology* I find this: "No physical relation has ever been traced between concussion of air and formation of water-drops. The belief is very ancient that battles are followed by rain. In Plutarch's *Lives* it is related that after the battle of Marsalia, in France, a great rainfall followed, and it is mentioned as being a well-known fact that all great battles are followed by heavy rain. This was certainly a case where the rain was not due to artillery fire." Mr. D. W. Horner, F.R.MET.S., of Westgate-on-Sea, has been good enough to send me an expression of opinion on the subject. He believes that with a dry and rainless atmosphere, such, for instance, as was experienced at the beginning of the war, no amount of cannonading, however violent, will cause a drop of rain to fall. If, however, the atmosphere be thick with rain-bearing clouds, as during the phenomenally wet December of 1914, he thinks that the rainfall, which would have been in any case heavy, would be made heavier "by the concussion setting free the extra moisture usually held in suspension."

But, after all is said and done, I am afraid it will be a difficult task to disabuse the minds of many people of the idea that rain is not a direct result of gun-fire.

## CHAPTER XVIII

### CAPELLA THE BEAUTIFUL

IN the pearly glow suffusing the north horizon on June evenings there is a beautiful star that shines in lonely splendour. It is far below Polaris, almost directly between it, indeed, and the skyline. Colourless of aspect in the pale twilight, it shows the most brilliant hues as the summer advances and it rises in the darkening north-east heavens.

Thus changed in appearance, and isolated as it is in June, the casual observer of the starry firmament may not at first glance recognise in it the chief of Auriga's stars, Capella. But let him watch its progress night after night until, say, at ten o'clock at the beginning of September, and he will then find that the solitary star of early June is associated with others, which, in the aggregate, he at once discovers to be a very familiar constellation.

I have frequently made a note of Capella in the summer-time. On the night of Sunday, June 25th, 1905, I wrote :

A superb evening. Low in the northern sky, which is strongly twilit, Capella coldly glitters. The luminous reflection clearly indicates the sun's place shifting round the north-west horizon.

Then on July 9th, 1907, at 10 p.m., I made this note :

Calm and cool ; wisps of cirrus cloud are becoming visible. In a large patch of tender green sky, due north, not many degrees above my skyline, Capella blazes in loneliness. It is a little to the westward of a line drawn from the Pole Star to the horizon, that is, of its lower culmination. Not far above Capella, the sky is of a darker greenish tint, and higher up still, to where Polaris shines, it is a dusky blue. Not a single star can I discern between Capella and the pole. Capella is exceedingly beautiful to-night ; as I have always thought it to be in such seasonal circumstances. It is vividly white, with just an occasional tinge of red.

The French astronomer Flammarion has said of Capella : “ Elle est éloignée du pôle de presque toute la distance qui, s'étend de notre horizon à l'Etoile polaire, c'est-à-dire de presque la hauteur du pôle à Paris, de sorte que, comme la Grande Ourse, elle ne se couche jamais pour nous, mais touche presque l'horizon du nord lorsque le mouvement diurne l'amène là-bas, à son passage inférieur au méridien ; ce qui arrive le soir en été, du mois de mai au mois d'août. Cette étoile, nommée Capella, ou la Chevre, brille dans une région relativement déserte, de sorte qu'elle n'est pas aussi facile à trouver que les précédentes.”

So when the placid summer evenings come let us not fail to watch for the gleaming of this solitary star in the pearly northern sky, for its contemplation is ever productive of pleasure. And if we should reflect on the distant source of its beams, we may be assured

that Capella is no near stellar neighbour that sends us greeting from out the northern glow.

## VARIABLES AND FAINT STARS

“The general conclusion with regard to all the regions I have under observation is that there are practically no variables among the very faint stars,” announced Mr. C. R. D’Esterre, of Tatsfield, Surrey, in the spring of 1914. And he added the following suggestive remarks: “It appears as though when we move out towards the confines of our universe we leave the region—and perhaps the cause—of variable stars. I have now a very considerable amount of evidence on this point. It is dangerous to announce variability on the evidence of a few plates only. A speck of dust, a pimple on the sensitised surface, or an insect crawling across the plate, can so easily produce the effect of irregular variability. I am not sure that observers, especially in tropical regions, have always taken this possibility sufficiently into account. I have one splendid case where a star is almost completely obliterated on one plate, though showing quite unchanged on the companion plate taken simultaneously. I feel almost sure that the result must be traceable to insect interference.”

Mr. D’Esterre, in the course of a letter to me on the subject, said that he conceived our stellar universe to be built up on somewhat similar lines to the Andromeda Nebula. Condensation had gone on much further towards the central parts, and the stars forming the more or less globular portion (including our sun) had atmospheres much denser than those of the average

Milky Way stars. After this condensation had proceeded beyond a certain point, he presumed that serious obstruction might be offered to eruptive forces at lower levels in the body of those stars, and that eventually either pulsations were set up which made the star a variable, or, perhaps, in certain cases, the pent-up energy disrupted the body, and we saw the phenomenon of a Nova.

## THE VOICES OF THE STARS

Listen to the quiet voices  
 In the stillness of the night,  
 When the dome of purple darkness  
 Sparkles with its gems of light.  
 Look upon those starry spaces,  
 Read the hidden secrets there ;  
 Beauty infinite surrounds you,  
 Mystic music fills the air.

Listen to the earth's soft breathing  
 As you lie upon her breast,  
 While she bears you through the ether,  
 Closely to her bosom prest.  
 Lo ! above, around, beneath you,  
 Hang the wondrous lamps of God,  
 Each a sun of shining splendour,  
 Quenched or lighted at His nod.

By a mighty Power directed,  
 Each moves on its silent way,  
 All unerring, all fulfilling  
 Their divinely ordered day.  
 Perfect wisdom, perfect order  
 Reign throughout the mighty vast,  
 Each gigantic power of Nature  
 To the throne of God held fast.

Listen to the quiet voices  
 They will speak if you will hear,  
 They will tell you that the finite  
 To the Infinite is near.

Do you crave, in hours of darkness,  
More than human sympathy ?  
Lift your eyes ! the stars are shining !  
Where they are Love, too, must be.

I am indebted to Mrs. H. P. Hawkins, of Reigate, for these very beautiful verses. Whether it be that Mrs. Hawkins is treating of the science she loves so well, or writing a hymn, or a letter to her friends, her pen is always steeped in charm and eloquence.

### A FAMOUS AFRICAN JOURNEY

In sending me Major R. A. Marriott's brochure, *The Change in Climate*, Admiral Sir Algernon de Horsey reawakened my interest in the Draysonian theory of the cause of the Ice Age, for the book is itself a defence of the theory. It so happened that in writing to thank the veteran Admiral for his gift, I remembered having read in Speke's *Source of the Nile Journal* that the Admiral was in command of the ship which took the African traveller and his companion, Grant, to Zanzibar, and I referred to the circumstance in my letter. In reply, he said :

When I was captain of H.M. corvette *Brisk*, on the Cape of Good Hope and East African Station, I shipped at the Cape Captains Speke and Grant, with them 12 mules, 10 Hottentots, and other impedimenta, and conveyed them down the East Coast of Africa to Zanzibar, at which place I landed them, men, animals, baggage, and all, to prosecute their adventurous (and afterwards successful) journey of discovery across the then unknown parts of Africa. On reference to my diary I am reminded that Capt.

Speke's chronometer watch (on which he depended for Greenwich mean time to find the longitude as he travelled) had stopped, owing to a slight defect in the hair-spring, which defect I was able to remedy, and started him with a correct error on Greenwich mean time.

The landing at Zanzibar is thus described by Speke : "The Hottentots, the mules, and the baggage having been landed, our preparatory work began in earnest. It consisted in proving the sextants ; rating the watches ; examining the compasses and boiling thermometers ; making tents and packsaddles ; ordering supplies of beads, cloth, and brass wire ; and collecting servants and porters."

In Speke's *Journal*, it is interesting to note, a lively account is given of how during the voyage the *Brisk* captured a ship-rigged slaver freighted with over five hundred old women and children, who had been captured during the wars in their own country and sold to the Arabs. Admiral de Horsey's version of that exciting incident is as follows :

As the *Manuela*, formerly the *Sunny South*, of Boston, was, I believe, the largest and finest slave ship, and contained the greatest number of slaves on record in a single ship, it may be of interest to state that that beautiful American clipper of 702 tons, at the time of her capture, was victualled for 102 days for the voyage from East Africa to Cuba, and contained 846 men, women, boy and girl slaves, each one of whom I saw counted and registered as they were brought up from the slave deck. Her crew consisted of captain, three mates, doctor, pilot, carpenter, and boatswain, and 40 Spanish men of ruffianly appear-

ance. I sent the slaves in charge of Lieutenant (afterwards Admiral) Adeane and a prize crew to Mauritius, where she was condemned before a prize court, and the slaves were landed.

Another brochure, in the form of a *Letter to Geologists*, has since been published by Major Marriott, who sums up the position in a line or two: "Drayson says the last glacial period came to an end in 5624 B.C., and that the cause of its occurrence was a much greater obliquity of the ecliptic. To the statement that a pronounced change of obliquity has ever occurred, astronomers will not assent."

Admiral de Horsey is himself the author of a book entitled *Draysonia*, in which there is a chart of the obliquity curve during a cycle of 31,756 years, showing the beginning, duration, and termination of the last glacial period. According to it the mid-temperate period was 29,000 B.C., when the obliquity was 23 degrees 25 mins. 47 secs.; the last glacial period began 21,000 B.C., with the obliquity 29 degrees 25 mins. 47 secs.; the mid-glacial period was 13,000 B.C., with the obliquity 35 degrees 25 mins. 47 secs.; the glacial period ended 5000 B.C., when the obliquity was 29 degrees 25 mins. 47 secs.; and we are now fast approaching the mid-temperate period again, when the obliquity will be once more 23 degrees 25 mins. 47 secs. As Major Marriott points out, the maximum obliquity would bring the Arctic Circle down to Durham, and would entirely deprive Scotland for several days in winter of direct sunlight.

## CHAPTER XIX

### THE PHANTOM PLANET

It was significant that during the solar eclipse of August 21st, 1914, no mention should be made of any search for the supposed planet between Mercury and the sun. Probably the belief in the existence of such a body has vanished from the minds of those astronomers who form eclipse expeditions. 'Twere well it were so, perhaps, for it cannot but be unsatisfactory to chase a phantom.

For my part, I have no doubt that Leverrier and Lescarbault were mistaken when they announced the existence of that intra-Mercurian planet which has come to be christened Vulcan. Leverrier submitted to the French Academy of Sciences, in 1859, a certain error in the secular motion of the perihelion of Mercury, which he could not otherwise explain than by supposing another planet to exist between Mercury and the sun. Then the astounding intelligence was laid before the Academy that not only had the body been found but that its discovery was actually made several months before Leverrier had calculated its presence. The finder was one Dr. Lescarbault, of Orgères, France, who happening to look at the sun through his telescope one bright afternoon saw, to his great surprise, a small round black spot pass over the disk, a circum-

stance with which he promptly acquainted Leverrier. The latter journeyed to Orgères and there gleaned what he looked upon as highly satisfactory information. That is how the matter came to be presented by Leverrier to the Academy.

Vulcan has had every chance to reveal itself since the days of Leverrier and Lescarbault. It has not done so, and the only reasonable conclusion, I think, is that there is no such planet to be revealed. In the year 1876 a German astronomer stationed in China, saw a small black spot on the solar disk and found that it quickly vanished. He promptly telegraphed the news to Europe that Vulcan had at last reappeared. Observations made at Greenwich and Madrid, however, proved that the alleged planet was merely a sunspot which had been carried out of view by the solar rotation.

On May 19th, 1885, that highly skilled observer, Mr. T. W. Backhouse, of Sunderland, wrote to *The Astronomical Register* as follows: "Again at the spring node of the accepted orbit of the supposititious Vulcan the sun was examined here each day (except Sundays) when the weather allowed, over the period during which a transit is possible, according to Leverrier, but with no positive result. It may be added with confidence that no planet-like object, certainly none with motion relative to spots, etc., was visible on the sun's disk at nearly all the times of my observations between March 15th and April 18th." Mr. Backhouse noted that on some six occasions the observation was not good, or not very good, or that the definition was bad. He considered that the question of Vulcan's existence could only be settled by

continued and systematic watching for its appearance in transit, as at the time of a solar eclipse it might be too near the sun to be visible.

## RICHTER'S DREAM

The mighty angel and the man whom God called up from dreams into the vestibule of heaven were speeding through space ; the rushing of planets was upon them, the blazing of suns was around them. " Then came eternities of twilight, that revealed, but were not revealed. On the right hand and on the left towered mighty constellations, that by self-repetitions and answers from afar, that by counter-positions built by triumphal gates, whose architraves, whose archways, horizontal, upright, rested, rose, at altitude, by spans that seemed ghostly from infinitude. Without measure were the architraves ; past number were the archways ; beyond memory the gates. Within were stairs that scaled the eternities around ; above was below, and below was above, to the man stripped of gravitating body. Depth was swallowed up in height insurmountable ; height was swallowed up in depth unfathomable. Suddenly, as thus they rode from infinite to infinite, suddenly, as thus they tilted over abysmal worlds, a mighty cry arose that systems more mysterious, that worlds more billowy, other heights and other depths, were coming, were nearing, were at hand.

" Then the man sighed and stopped, shuddered and wept. His overladen heart uttered itself in tears, and he said : ' Angel, I will go no farther ; for the spirit of man acheth with this infinity. Insufferable is the

glory of God. Let me lie down in the grave and hide me from the persecution of the Infinite, for end I see there is none.' And from all the listening stars that shone around issued a choral voice, 'The man speaketh truly; end there is none that ever yet we heard of!' 'End is there none?' the angel solemnly demanded; 'is there indeed no end? And is this the sorrow that fills you?' But no voice answered, that he might answer himself. Then the angel threw up his glorious hands to the heaven of heavens, saying, 'End is there none to the Universe of God? Lo! also, there is no beginning.'"

It is stated by Miss Mary Proctor (in her *Half-Hours with the Summer Stars*) that possibly this noble dream suggested to her father, the late Richard A. Proctor, the poem entitled *Voices of the Suns*, which begins:

I watched the depths of darkness infinite  
Bestrewn with stars, till dreaming I beheld  
From out the mystic realms beyond my ken  
A star come forth with even gliding rush.

A footnote to the poem read: "Lines suggested by four lectures on astronomy." At the conclusion of one of those lectures ("Star Depths") Proctor recited "Richter's Dream."

I once heard Mr. Richard Kerr give a powerfully dramatic recital of the "Dream" at the end of a lecture on "The Splendours of the Heavens." His audience was a Sunday evening one, mostly of young men and women, some of whom seemed disposed to frivolity when Mr. Kerr began to talk of Sirius and Orion and of the Pleiades. But in time a change fell upon them, and I shall never forget the deafening

applause that shook the great theatre when he finished reciting Richter's Dream of the overpowering effect of the universe upon the human mind.

## TELESCOPES AND TEMPERATURE

The silvered-glass speculum is known to be inconveniently subject to changes of temperature. Special study has been given to the matter by the Rev. W. F. A. Ellison, of Fethard-on-Sea, Waterford, who holds that a change of two degrees Fahrenheit has a very visible effect, whilst one of ten degrees will render the best figured mirror ever made temporarily useless. The physical properties of glass account for this. The astronomer working with a clear night-sky does so under conditions which usually mean a falling temperature, and a falling temperature affects his mirror. On some clear nights, Mr. Ellison submits, a large telescope is almost useless. The "seeing is bad," and the general cause of it is the mingling of air currents of varying temperatures and densities. "Sometimes the drifting of an air current of a different density from the rest of the atmosphere across celestial objects can be clearly seen through a telescope."

In writing to me on the subject, Mr. Ellison said (December 9th, 1914): "Any person who possesses a reflector can, if he chooses to watch for them, and is able to recognise the symptoms, observe for himself the fluctuations of figure due to changes of air temperature, and draw the inevitable inference that a star test may pronounce one and the same mirror over-corrected at one time and under-corrected at another, and that as a direct consequence the only

really reliable test is one carried out in a properly situated workshop where equilibrium of temperature can be maintained.”

## BRIGHTNESS OF MIDNIGHT SKY

Some interesting observations made by Mr. Gavin J. Burns, at Blackheath, have led him to the conclusion that the brightness of the midnight sky is in ordinary circumstances a constant quantity. He fixed upon the northern sky, near the North Pole, for his tests, and though there were variations in the luminosity, he believes that they can be explained without assuming any variation in the intrinsic brightness of the sky itself. A high degree of luminosity on August 11th, 1913, he thinks, was most likely due to a slight amount of twilight, whilst a low degree on February 22nd and 27th, 1914, was doubtless to be attributed to an absence of small particles in the atmosphere, and a consequent lowering of the reflective power. A low degree, also, on March 18th and 19th, 1914, was probably owing to an absence of dust caused by heavy rain during the day.

When Mr. Burns' fellow-members of the British Astronomical Association discussed his experiments, the question was asked by Mr. H. J. Bunker whether the least brightness would not occur somewhere near the time of the new moon. Mr. Burns' observations, however, were made when the moon was below the horizon, and his impression was that if any moonlight was visible the amount would be quite insignificant. One or two of the observations were made on clear nights, though cloudy. There were breaks in the

clouds. The best nights for observing were after heavy rain. Mr. Burns having observed at a distance of only seven miles from the heart of London, he thought it obvious that the determinations must be affected by a large error arising from the illumination of the atmosphere by the street lamps and other terrestrial sources.

### CLOUDS AT SUNSET

Why does a bank of cloud often arise in the west at sunset after a clear day? This is one of several interesting questions put to me by Mr. Samuel Scott, of Bramley, Yorkshire. It is a point I have not previously thought of, but let us see what can be made of it. In the first place, the very important fact must be realised that most of our weather comes from a westerly quarter. Let us suppose, then, that the sun has just set. The withdrawal of his rays has led to a rapid cooling of the air. A breeze comes up from the westward, laden with warm air. This mingles with the air cooled by the departure of the sun and quickly condenses, thus forming a mass of cloud which, as the breeze advances eastward, gradually overspreads the whole sky. Should the clouds remain hanging about the west horizon it seems to me indicative of the fact that the breeze has died down before reaching the spot where the observer has a clear sky overhead.

### THE MULTITUDINOUS STARS

It was estimated by the late Simon Newcomb that the largest telescopes and the camera combined could reveal fully a hundred million stars, but the late Lord

Kelvin thought that a thousand millions would be nearer the mark. Who, however, can place a limit to the number of stars in the universe,—and, incidentally, to man's curiosity? If, in the future, ten thousand millions were disclosed, the inquiring scientist would still be curious to know what lay beyond, for there would still be a Beyond.

The decision to chart the stars was the outcome of an International Conference convened by the Paris Academy of Sciences. Observatories scattered all over the world are participating in the work. The importance of obtaining a permanent record of the heavens as they exist at present cannot be overestimated. Astronomers of the future will be able to compare their own charts with those now being taken, and will thus learn at a glance what slow but steady changes are being effected in the relative positions of the stars, also whether new stars have appeared or old ones disappeared. It was recently my pleasure to hear from one of the workers on the great Star Chart,—Mr. J. T. Moore, of Hatfield, Doncaster. He was for a considerable time engaged upon the very delicate and skilful work of measuring for the chart, but illness, unfortunately, compelled him to relinquish his labours before the task was finished. The last plate measured by him was on April 1st, 1910, making 405 plates in all, and the total number of measures 317,672. The Oxford section of the chart on which he was engaged was completed in 1911.

Though the stars, as revealed by the telescope and camera, are indeed multitudinous, only about three thousand are visible at any one time with the naked eye. Some observers, however, are possessed of

exceptionally keen vision ; Heiss is said to have been able to see 3903 stars from mid-European latitudes. But even to those casual observers who know nothing of telescopic and photographic stars, there is always the feeling that hosts of others are behind those stars which they can see shining down upon them on a clear night. To them the orbs of heaven are mysteriously multitudinous. The Milky Way itself, though so nebulous, undoubtedly conveys the impression of being the combined light of millions of stars. When Belt was in Nicaragua, he wrote : " The trembling stars peeped out from the vault of heaven, and soon a million distant orbs proclaimed that the world was but a grain of dust in the vast universe, that the things of earth were but for a moment, and, as a shadow, would pass away." One can understand the impression of " a million distant orbs " in the skies of Nicaragua. It is probable that the Milky Way was shining with uncommon splendour.

## CHAPTER XX

### SHAKESPEARE'S "SEVEN STARS"

THE deathless works of Shakespeare contain many astronomical allusions, as do those of Tennyson and Dante.

In the second scene of the First Part of King Henry IV, we have Prince Hal inquiring of Falstaff what *he* has to do with the time of the day, and telling him that "unless hours were cups of sack and minutes capons, I see no reason why thou shouldst be so superfluous to demand the time of the day." Whereupon Falstaff makes answer: "Indeed, you come near me now, Hal; for we that take purses go by the moon and the seven stars, and not by Phœbus—he, that wandering knight so fair."

What did Shakespeare mean by the "seven stars"? One commentator thinks they are probably the "constellation Pleiades," though, it may be mentioned, the Pleiades are a star-cluster rather than a constellation, in that they form part of the constellation Taurus, as do the Hyades.

I think that Mr. H. Metcalfe, of Fleetwood, is likely to be more correct, when, in some manuscript notes he has just shown me, he expresses the opinion that Shakespeare meant "the Great Bear's seven stars." Mr. Metcalfe points out that Shakespeare nowhere mentions the Pleiades. He does, however, refer to

the Plough, under the name of Charles's Wain. And, of course, as Mr. Metcalfe shows, the Plough would be much more easily recognised than the Pleiades, as the former is visible throughout the year, whereas the latter are, approximately, to be seen only during the autumn and winter months.

“For we that take purses go by the moon and the seven stars.” In other words, these celestial bodies gave the purse-snatchers roughly the time o' night, a purpose to which the seven stars of the Plough, in particular, would be well adapted.

### MAY'S NIGHT-SKIES

The night-skies of May have a beauty quite their own. It is a beauty not so much of stellar voluptuousness as of a sweet and soothing serenity that adds zest to one's *joie de vivre*, and engenders the highest appreciation of the inestimable blessing of a deep-rooted love of Nature.

On no other nights of the year do the stars seem to shine so placidly or the sky to put on that rich indigo colour which makes so exquisite a background for its gleaming points of silver.

The winter stars—Sirius above all—with their turbulent scintillation, would disharmonise with these night-skies of May. Orion has gone, and so have the Pleiades and the Hyades. The only familiar groups that remain are Gemini and Auriga. The Gemini stars form a large parallelogram, which during the winter months is usually seen on its side. With the advent of May, however, it is almost on end as it nears the west horizon. It was thus that I saw it,

apparently about to plunge into the western ocean, as I sat one lovely May night, a year or two ago, on the Digue Sainte-Beuve, at Boulogne. The hour was ten ; the sky was brilliant with stars after the fierce rain-squalls which had passed across the Channel from the English coast ; and out on the quiet sea were many lights of vessels twinkling for all the world like the brighter lights above.

## THE JULY STARS

After the stars of May, what of those of July ? But perhaps our thoughts on summer eves are more inclined to dwell upon

The grateful sweetness of the new-mown hay.

Perhaps our enthusiasm is not roused at the knowledge of the red star Antares being visible the full round of the month, with Arcturus as well. Perhaps we are worse than indifferent to Ophiuchus and Hercules filling the centre of the southern sky at about ten o'clock when July opens, or to Aquila and Delphinus and Equuleus combining to assist in the completion of a very imposing celestial picture. In strolling through the fragrance-breathing lanes and fields perhaps we neglect to bestow a single glance upon blue-eyed Spica flashing in the south-west, or the familiar Bear gliding down head first westward of the Pole. I say perhaps. It may be, of course, that we still turn in silent admiration to the lambent beauties of the heavens. So let me not indulge in teasing doubts.

## SUMMER SHOOTING-STARS

## I

With the incoming of August the sky-student sets a watch for certain famous shooting-stars. To the casual observer they are known as the August meteors ; to science they are the Perseids. Why the Perseids ? Simply because they appear to radiate from that ancient constellation Perseus, just as the November meteors are called the Leonids by reason of their apparent emergence from the constellation Leo, celebrated for its sickle-shaped group of bright stars.

And Perseus ? Where shall one look for it in the delightful evenings of early August ? Well, everyone must know the Pole Star, and surely everyone must also be able to locate the Great Bear. Not, however, that Perseus is in the very near vicinity of either, but rather that, to employ them as guides, the constellation is on the opposite side of the Pole to the Great Bear, and at about the same height above the north horizon. The Bear, for example, between ten and eleven o'clock, is at the lower left-hand segment of the circle which it describes round the Pole, whilst Perseus is at the lower right-hand segment. Its scimitar-shaped group of stars ought to be readily recognised—as readily, indeed, as the large capital “ W ” formed by Cassiopeia above. It is a fascinating quarter of the heavens this in which Perseus and Cassiopeia are placed.

A feature of these Perseids is that they are so long-

drawn-out as almost to lag superfluous on the celestial stage. How different in that respect from the November shooting-stars ! How different, too, from the Andromedids ! These showers are meteoric indeed, mere flash-in-the-pan-like displays compared with those dallying Perseids. Of course, over the Perseid period the radiant does not remain fixed. It moves about one degree every day towards the east-nor'-east, and when the display reaches its maximum, the radiant is on the border of Cassiopeia.

St. Lawrence has truly an impressive perpetuation of his tears in these patriarchal Perseids. What matters it whether the tears were the result of his slow grilling to death on a gridiron, or of chagrin at the cowardice of others ! Sufficient that the martyr's tears were shed, for are they not declared to be seen dropping on the hot embers on his festival day !

The tears of St. Lawrence ! A strange name for the August meteors, in truth ! But, be it remembered, only those meteors from the Perseus quarter in the nor'-nor'-east heavens. There are meteors, with an occasional fireball, pretty well all around the month of August. But not all of them are "tears."

## II

How glorious was the close of the summer meteor season of the year one thousand nine hundred and eight ! Thanks to the presence of a favouring anti-cyclone in this region of Western Europe, our night-skies were brilliantly clear, though the southern heavens were illumined by the moon. Yet what mattered it when first and second magnitude meteors were flashing

out in the north? One felt at such times that the old moon was very far indeed secluded in the chambers of the south; so far secluded that she scarce could show her envious visage above the ridge of houses immediately interposing in the line of vision. No, the glimmering moonlight offered not the least obstacle to northern observations of these August meteors; and I, for one, indeed, had never expected that it would do so. For all that, I have had just a little misgiving about having, perhaps, missed a fine meteor or two in the moonlit region of the south.

But what a spectacular feast I had in the circum-polar heavens and their immediate vicinity! So away with vain regrets that savour of selfishness. It has often struck me how favourable to meteor observation is that portion of the night which fringes the midnight hour. To be more precise, I will fix the time from eleven o'clock to one. And that is a time when, in the deep silence of the night, there is something inexpressibly solemn and grand about these celestial pyrotechnics, so silent themselves, yet so ideally suggestive of irresistible power. For never once have I heard the slightest sound come from any meteor, though the heavens might be aglow with its light. To me the maximum display was on the night of August 10th—but not of Perseids, watch the Cassiopeia region as I would. No, the most numerous and beautiful meteors were from the Great and Lesser Bears, and from Corona Borealis, the beautiful Northern Crown.

Poor old Bear! Not since the Leonid shower of five years before had I seen him so bombarded by these aerial missiles as was the case on August 10th–11th. One of them, at 11.40, dropped—glowing red, orange,

and green—midway between Mizar, the middle star in the tail, and Benetnasch, at the tip of the tail. Then another, eight minutes later, appeared as though in its swift flight it lightly brushed Alpha, or Dubhe, the more northern of the Pointers. A third, ten minutes past midnight, shot rapidly from just above Mizar to four or five degrees beyond Benetnasch. Meanwhile, however, the Pole Star, always so apparently steadfast, gave one a momentary impression that it had decided to remain steadfast no longer, for from its very place it seemed, at 11.43, a fine meteor of the same size and colour as itself fell swiftly downwards at least fifteen degrees. From Cepheus, too, at 11.49, a bright meteor flashed and left a golden trail as far as the very fringe of Draco's head.

## RAINBOWS

One bright afternoon in the early summer of 1914 I was walking with a friend in Kensington Gardens. We stood for a while admiring the beauty of the fountains, which were in full play in the brilliant sunshine. The sun was over in the direction of the magnificent Albert Memorial—and lo! on several of the fountains there appeared the loveliest of rainbows (or spray-bows), each hue projected against the opposite green slope with a vividness that drew forth involuntary expressions of admiration from both my companion and myself. The bows did not seem to be more than ten yards distant, at the farthest. The effect, in its way, was as striking as one which I witnessed at Hartlepool in the Spring of 1889, on the occasion of Prince Albert Victor "opening" the great Headland

Protection Wall, popularly known in the district as the Promenade. The sea was dashing against the Wall with winter-like fury, and as the spray shot up in the sunlight rainbows appeared on it apparently at a distance from where I stood of some fifty or sixty feet. It was a scene of unforgettable beauty, heightened by the presence of a brig under close-reefed topsails labouring in the heavy seas scarce a quarter of a mile from the rocky shore.

How far off is the rainbow in reality? When the *Beagle* was anchored in an inlet in the southern part of the Chonos Archipelago, a storm "worthy of Tierra del Fuego," says Darwin, raged with great fury. "During a few minutes there was a bright rainbow, and it was curious to observe the effect of the spray, which, being carried along the surface of the water, changed the ordinary semicircle into a circle—a band of prismatic colours being continued, from both feet of the common arch across the bay, close to the vessel's side, thus forming a distorted, but very nearly entire ring."

A rainbow, my valued friend and correspondent, Mr. C. T. Whitmell, tells me, is indefinitely far away, because it is produced by parallel rays of light. "It is not located in the drops," he says, "though due to them. Whether the drops are a yard or a mile away makes no difference to the distance of the bow. The image of the sun reflected from a mirror a yard away is not close to you. It is only the glass that is close. As you walk to or from a bow the distance of the bow itself is unaltered, and its size (angular magnitude of radius 41 degrees) remains unchanged—a proof that it is indefinitely distant."

## CHAPTER XXI

### ASTRONOMY IN THE ARCTIC

#### I

READING M'Clintock's journal of his successful search for relics of the Franklin Expedition, it interested me to alight on the following entry for September 15th, 1858: "While in the vicinity of Bellot Strait, two nights ago, a comet was observed just beneath the constellation of the Great Bear; a series of measurements was commenced for determining its path." This comet which M'Clintock's gallant company sighted was none other than Donati's, one of the grandest objects of its kind known to astronomic science.

Donati, the Italian astronomer, discovered it at Florence on June 2nd, 1858, when, as the late Ellard Gore said, it was a "small glimmering nebulosity." In a little over a week subsequent to the comet being seen from the polar regions, it had become fairly conspicuous, nearly equal, indeed, to a star of the first magnitude. It was visible at that time half an hour after sunset. It rapidly increased in brightness until, during the first week in October, it had become an object of great magnificence. One who saw it, remarked, "Few more picturesque celestial effects have

been witnessed than it presented on October 5th, when Arcturus blazed undimmed through the denser part of the tail in brilliant conjunction with the equal splendour of the nucleus."

I have seen at various times some very impressive drawings of this superb comet's position among the stars during the first few days of October, 1858. One of them—and it is the one which perhaps I recall with the greatest amount of pleasure—depicts the comet on a dead-black sky with its head approaching Arcturus and its immense plume curving gracefully over in the direction of Benetnasch, the bright star at the tip of the Bear's tail. The Bear was then at its lower culmination, that is, between the Pole and the north horizon. The comet's plume had at that time attained a length of forty degrees and an extreme breadth of eight degrees.

The late Dr. Dolmage's book, *Astronomy of To-day*, contains an attractive reproduction of one of Bond's beautiful drawings of Donati's comet four days after it had passed Arcturus, and some time before it ceased to be visible with the naked eye, whilst in Todd's *New Astronomy* there is a small picture which has always interested me, in that it shows the comet under the tail of the Bear with the plume pointing towards Phecda, the star immediately below Megrez, in the root of the tail.

Donati's Comet was seen without optical aid for over 100 days. It was followed with the telescope well into the year 1859, and when it finally departed into the far-distant regions of space it did so not to return for 2000 years to come. The Bellot Strait which Admiral M'Clintock mentions in connection with the

observation of the comet was, I take it, named after Lieut. Bellot, the French explorer. It was shortly after reading the adventures of the *Fox* that I stood near the monument erected to the Lieutenant's memory, in front of the Royal Naval Hospital at Greenwich.

## II

Under date January 26th, 1859, Admiral M'Clintock remarks that part of the sun's disk loomed above the horizon "somewhat swollen and disfigured by the misty atmosphere," and he tells how he halted to feast his eyes upon the glorious sight, and to scan the features of their returning friend after an absence of 73 days. He adds: "On looking over the records of previous voyages, I find that the average amount of refraction upon the horizon is about 45 minutes of arc, the temperature being 35 degrees below zero. Last year, when the sun reappeared, on January 28th, there was 59 minutes of refraction, and the temperature at the time was 38 degrees below zero."

In regard to this instructive example of polar refraction, I might say that at the horizon in temperate latitudes, refraction appears to be on the average 34 minutes 54 seconds; but, of course, it is necessary that the thermometer and the barometer should both be read. It has been ascertained that refraction is increased by a low thermometer and a high barometer, which will explain the large amount of it observed by Admiral M'Clintock with the temperature so far below zero. Those extraordinary shapes assumed by the sun near the horizon are due to refraction, though I cannot say that I have observed the moon to display

such frequent grotesque distortions when rising or setting as the sun does.

There is in this Arctic journal a picturesque entry for November 3rd, 1857, from the neighbourhood of Cape York, that Baffin Sea promontory so well known to polar explorers. It reads: "I remained up the greater part of last night taking observations, for the evening mists had passed away, the lovely moon reigned over a calm enchanting night; through a powerful telescope she resembled a huge frosted-silver melon, the large crater-like depression answering to that part from which the footstalk had been detached. Not a sound to break the stillness around, excepting when some hungry dog would return to the late battlefield to gnaw into the blood-stained ice."

It may be worth while mentioning that the telescope through which the gallant Admiral saw the moon was lent to the Franklin Search Expedition by Lord Wrottesley, at that time President of the Royal Society.

The Expedition recorded the appearance of a very brilliant meteor on October 24th, 1857, also in the vicinity of Cape York. It passed through Cassiopeia in a nor'-nor'-east direction, "very much like a huge rocket," the flash being so brilliant that a man whose back was turned to it mistook the illumination for lightning. It may be recalled that during the display of August meteors in 1913 there appeared off the east coast of Scotland a very luminous fireball, which to some observers who were turned away from it, illumined the sky like a searchlight.

On October 22nd, 1858, when the ship was near Bellot Strait, an intensely vivid flash of lightning was

observed at eight o'clock in the evening. Its appearance in that region was remarked upon by the Admiral as being very rare ; indeed, once only had he seen it before—in the September of 1850. When the Expedition was waiting to escape from winter quarters, on August 3rd, 1859, a north-east gale sprang up, and two claps of thunder were distinctly heard. This led to the Admiral again recording that such an event occurred but very rarely in those latitudes.

## ORION'S BELT AND NEBULA

The three stars of Orion's Belt form one of the most popular groups in the starry heavens, though I doubt if their individual names are generally known. The uppermost (Delta) was named by the Arabs, Mintaka ; the centre one (Epsilon) was Al Nilam, and the lowermost, or most easterly (Zeta), Al Nitak, meaning "the girdle." Admiral Smyth says that the Belt was called Jacob's Staff, also that it was the "Golden Yard" of seamen, the "Three Kings" of soothsayers, the "Ell and Yard" of tradesmen, the "Rake" of husbandmen, and "Our Lady's Wand" of the Catholics. I have myself frequently heard it spoken of in the North of England as "The Yardstick," and have always attributed that popular name to the apparent length of the Belt suggesting a yard measure, as I have found it a very common practice, even in these days of scientific enlightenment, for celestial measurements to be gauged by terrestrial standards.

Immediately below the Belt is the Giant's "Sword," composed, to all appearances, of three rather faint stars. They give no indication at first glance of con-

taining anything of unusual interest. But if a fine night be chosen, and the centre star of the three be looked at fixedly, a tiny misty spot will come into view. That tiny misty spot is the renowned stupendous Nebula of Orion, the like of which the whole starry sky cannot produce.

I do not know that anything in the wide heavens has since quite so impressed me with such an air of awful mysteriousness as did that nebula, when, one very dark night, in a secluded spot, I first looked at it through a small telescope. I did, indeed, feel that I was gazing out into the deepest depths of space and seeing Nature silently and steadfastly at work in star-making.

That changes in this vast nebula do occur is certain, but that it will require many centuries of observation to reveal them is equally certain. No message of any such change has so far been transmitted across the mighty gulf that separates us from the nebula, for I do not think that too much reliance should be placed upon any alleged alterations of form shown in hand drawings. I think it would be pretty conclusive evidence, however, were any marked change made manifest in a good photograph after the most careful comparison, not with a drawing, but with another good photograph.

It is significant that the nebula should contain a great many variable stars. Further, it is interesting that three distinct gases should have been discovered in it. Perhaps, therefore, when this great Orion Nebula has evolved into a glittering star-cluster, those stars will exhibit a variety of colours even more approximating to Herschel's "superb piece of fancy jewel-

lery ” than the cluster about Kappa Crucis to which he applied that picturesque description.

## OF A MOON-ECLIPSE

There was something unreal about that November moon-eclipse. It was ushered in theatrically, for earlier in the evening there were intermittent double coronæ of the most exquisite hues, as if the “ Queen of heaven’s bright isles ” were desirous of proclaiming to all men her coming conflict with the earth’s shadow, from which she would triumphantly emerge more radiant than ever.

When the moon’s lower left-hand rim first showed indications of flattening, the time was 10.40, with the atmosphere very transparent and the temperature below freezing-point. The penumbra then appeared to be rolling over the disk like volumes of grey smoke, driven forward by the advancing shadow. At eight minutes to eleven the shadow had taken a substantial bite out of the lunar features, and it was possible to predict a “ light ” eclipse. It is, indeed, singular how “ light ” or how “ dark ” a moon-eclipse can really be, for a greater contrast in that respect than the phenomenon in question and, say, the eclipse of April, 1903, it would be difficult to imagine. The shaded portion of the moon at 10.52 was of a distinct reddish brown, making the segment quite bright compared with what happened at the 1903 eclipse.

By eleven o’clock the moon was nearing the meridian, and was in a direct line with, and midway between, the head of Aries and the ruddy star Aldebaran. The shadows on the snow-covered ground and on the

roofs of the adjacent houses began to lose their definite outline. The Pleiades were twinkling—with, I thought, Alcyone unusually prominent among them—a few degrees up to the left, whilst below them the V-formed stars of the Hyades came out as they might at the oncoming of night. I could easily separate Theta Tauri without optical aid, despite its nearness to the moon.

As the first quarter after eleven chimed from the distant churches I judged that the shadow had crept just half-way across the disk. At the second quarter it had reached the upper part of the "Lady's" forehead, her hair only remaining free. Her features were distinctly discernible under the ruddy veil which had been so ruthlessly drawn over them. The sky had then become a deep blue, and many of the small stars were out, dancing as though with joy at their emancipation from Cynthia's overpowering radiance. A dainty golden segment at the upper right-hand was all that was left clear at twenty minutes to midnight. But not only was the entire rim of the moon then visible; the features of the disk were easily traceable also. Five minutes before midnight brought totality, and a strange-looking satellite was hung high up among the stars, dimly gazing down on an unearthly-looking earth. It was a moon with daubs of yellow, red, and purple on its bleared face; something like a moon in a melodrama—badly painted.

## A CLOUDY OCCULTATION

If only that great Easter anticyclone had delayed its departure a little longer! But what *could* it do in

the face of such a bombardment by besieging depressions? To ignominiously capitulate was its only course. Then in rushed the cyclonic invaders from over the broad bosom of the Atlantic Ocean; the clouds gathered, the winds blew, showers hurtled over the parched land, and a rare phenomenon, an occultation of Mars, was—but let me tell the sad story in detail.

How we had looked forward to the event! for to us, at least, it was unique. And with what care had we thought out the several points to be noted at immersion and emersion! Indeed, the only point that we seemed to have overlooked was the weather, and all because that Easter anticyclone had been so long with us—from the middle of March—that we took it for granted that a further stay of a few weeks more or less would make no difference to the stupendous sunshine-bringer. The disillusionment was brutal.

The evening of the occultation arrived, the evening of the 13th (ominous day) of April. The day had been sunless, but at a quarter-past six we caught a fleeting glimpse of the crescent moon high in the sou'-west, with the scud flying past it from south'ard. At that hour the light was much too strong for Mars to be seen. Then a spell of cloudy obscurity until 7.35, when in the deep dusk and the streaming vapour the ill-defined moon again appeared, and the next instant so did the planet, looking a pale yellowish colour, like an elevated and much chastened Mercury. 'Twas but a moment's glance that they cast from out turbulent cloud-land. Again obscurity, that left us wondering how the moon in its eastward course could possibly reach the planet by about half-past ten, so far away from it did Mars appear.

An hour and three minutes later brought some amends in a swift but charming view of the moon and planet set with great distinctness in a patch of indigo sky in the west. The breadth of the full moon only lay between the moon's dark limb and the planet, the latter being slightly higher than our satellite's upper horn.

Rain and wind followed this fleeting vision ; but at 9.20 further cloud-breaks occurred. In a small one in the south-east Jupiter and Gamma Virginis appeared, almost side by side ; in another, eastward, Arcturus blazed out ; then Procyon disclosed itself in the south-west, and Castor and Pollux above it—but no Mars and no moon ; everything remained of funereal sombreness their way.

And thus did it remain for the rest of the wretched night. The clouds were the great occulters ; the occultation was *universal*, with the elemental addition of wintry gusts and marrow-chilling, sputtering rain. Yet they do say that the night brought exceeding joy to the farmer with his thirsty fields. If that be so, then we are very content.

## NATURE AT REST

It was all very wonderful on this early Autumn day. Only a few hours before a fierce gale had raged round our shores, a deep twilight gloom had prevailed, privation and death by sea and land had marked the track of the storm, and the cliffs had resounded with the thunder of the surf ; and now as I stepped from the train at the little wayside station of Hart, scarce

more than a stone's-throw from the North Sea, the sun shone warmly, the air was bright and clear, not a leaf or twig moved, the country and the shore smiled again and all was peace.

I took the path that led to the sea, and descended into a delightful ravine where the shadows of the surrounding heights fell upon the waters of the turgid stream. The primitive bridge had been washed away and so I stood by the side of the torrent for some moments and looked about me.

In time I was taken back to yesterday. I saw in my mind's eye those sturdy giants on yon woodland slopes shake and shiver and bend before the blast; I saw great branches hurtling through the air and heard the wind howling with joy over its ruthless work; I saw the swelling sandhills rear their heads in proud defiance of the foe.

The transformation was indeed complete, with the sunlight and shadow sporting among the trees like young squirrels and with a tranquillity so soothing all around.

I at length succeeded in crossing the stream, and walked along its margin for a little way. Then through fiery bracken, knee-deep, and reed-like grass I trudged up a high and steep sand-slope. From the summit I had an expansive view of the sea. There were no angry waves to-day, with their crests blown by the gale into smoke; there was no surging to and fro on the beach of milk-white breakers; there was only a placid sea spread glittering in the sunlight, with the tiniest and merriest of wavelets chasing one another laughingly up the golden sands. It was here difficult to believe that yesterday had ever been.

In a contemplative mood I descended to the beach. Down there my foot caught against something buried in the sand. It was a piece of wreckage left by the receding tide. . . . The spell was broken. I hurried homeward.

## INDEX

- Admiral de Horsey and Captains Speke and Grant, 155, 156  
 — — his capture of a famous slaver, 156, 157  
 — — and the Ice Age, 157  
 Altair, steady light of, 64  
 Andromeda Nebula, spectrum of, 83  
 Antares in July, 169  
 Arctic regions, midnight scene in, 78, 79  
 — — astronomy in the, 175-179  
 Arcturus in July, 169  
 Aries stars unusually bright, 28  
 Aristotle and stars in daylight, 94  
 Atlantic Ocean, great storms in the, 39-47  
 August meteors, fine display of, 172, 173  
 Aurora Borealis, 23, 24  
 Azores, the, and a famous ocean rescue, 47  
  
 Bates' *Naturalist on the River Amazons*, reference to lunar halo quoted, 103  
 Beech trees and lightning, 118, 119  
 Bell-ringing and the production of rain, 148  
 Belt, Thomas, and the starry heavens in Nicaragua, 166  
 Bournemouth, clear night-skies at, 64, 65  
 Buenos Ayres, terrible thunder-storm at, 117  
  
 California, thunderstorms in, 121-123  
 Capella, 21, 24  
 — in June and July, 151, 152  
 Carse, Dr., on fatalities from thunderstorms, 118  
 Caterham Valley, heavy storm in, 119, 120  
 Cats and weather, 110-112  
 Clouds at sunset, why formed, 164  
 Comet, Delavan's, 128, 129  
 — Donati's, 175, 176  
 — Encke's, and meteors, 129, 130  
 — Morehouse, how discovered, 25  
 — reference to, by Dekker, 50  
 Cor Caroli, 24  
 Corona Borealis (The Northern Crown), 23, 24  
 Coronæ, their weather significance, 106  
 — Humboldt's remarks upon, 107  
 Crommelin, Dr., on Encke's Comet, 129, 130  
 Cyclones, a winter of, 39-47  
  
 Darwin and glow-worms, 62  
 — and thunderstorms at the mouths of great rivers, 116, 117  
 — on an electric storm at Monte Video, 117, 118  
 — reference to a striking rainbow, 174  
 Daylight Comet, the humours of its visitation, 49

- Davidson, the Rev. M., on meteor showers, 127, 128
- De Saussure and sky tints in Switzerland, 92, 93
- "Drake's Comet," 49, 50
- Earth-shine on the Moon, 74
- Eclipse, solar, of 1911, 68
- — — 1927, 69
- — — August 21st, 1914, 100
- Espin, the Rev. T. E., and double stars, 103
- Falstaff and the "Seven Stars," 167
- Fancied figures in the Moon, 89-91
- Fiji, night-sky in, 70-73
- Filey fisherman's weather prediction, 107, 108
- Fog by the sea-shore, 29-31
- Fomalhaut, its coyness to northern observers, 65
- as seen from the Durham coast, 66
- how far north has it been seen with the naked eye, 66, 67
- Français*, the story of its gallant fight and subsequent loss, 131-141
- Gemini in May, 168, 169
- Glow-worms and stars, 61-63
- Great Bear, how Marco Polo measured its altitude, 49
- — and Shakespeare, 167, 168
- — in July, 169
- — in early August, 170
- Gun-fire, heavy, its audibility, 120
- and rain, 144-150
- Gruis, Gamma, seen with the naked eye from Bournemouth, 65
- Halley's Comet, fatal fear of collision with, 51
- — result of contact with the tail of, 51, 52
- — its disappointing appearance in England, 52, 53
- Halley's Comet, its rapid disappearance from naked-eye visibility, 53, 54
- — in South Africa, 54
- Halos, lunar, 101-106, 114, 115
- — sequel to one in Brazil, 103
- — referred to by Whympier, 105
- — belief as to the number of stars in them, 105
- — seen in Tasmania, 105
- — their study valuable to agriculturists, 106
- solar, and the weather, 107, 108
- Harrogate, observations of Fomalhaut from, 67
- Hart (Co. Durham), a quiet autumn day near, 175, 176
- Hartlepool, great storm at, 11-19
- sea view from, 173, 174
- Bay, summer scene in, 57, 58
- — moonlight night on, 58, 59
- Hawkins, Mrs. H. P. : *The Voices of the Stars*, 154, 155
- Heiss and his keenness of vision, 166
- Humboldt and glow-worms, 63
- on Sirius and Canopus, 107
- his remarks on coronæ, 107
- Hyades, interesting observation of, 28
- Ice Age, Drayson's theory and astronomers, 157
- July, stars of, 169
- June, a month of northern glows, 56
- Jupiter, scintillation of, 35, 36
- naked-eye visibility of satellites, 142-144
- Lightning, a brilliant display in London, 115, 116
- suggested safeguards from, 121
- and open windows, 121
- Longscar Reef (Durham coast), 30, 137, 138

- Lowell, Prof. Percival, and his work, 82-85
- Marco Polo and the altitude of the North Star, 49
- Mars, its fascinating mystery, 33  
— scintillation of, 35, 36  
— dust-storms on, 83  
— its rotation period, 83  
— and irrigation theory, 85, 86
- Marriott's *The Change in Climate*, 155, 157
- Martian research, 34
- May night-skies, 168, 169  
— night at Boulogne, 169
- Megrez, 21
- Mercury, scintillation of, 34-36  
— the transit of, November 7th, 1914, 98
- Meteors, popular mistakes concerning them, 124, 125  
— alleged hissing sound of, 124  
— supposed to be near observer, 125  
— when most abundant, 127, 128  
— in August, 170-173
- Midnight sky, experiments on the brightness of, 163, 164
- Milky Way, 24, 33  
"Miner's Comet," 50
- Monte Video, damage by lighting at, 117, 118
- Mont Blanc and stars in daytime, 92, 93
- Moon, earth-shine on, 74, 84  
— horizon enlargement of, 75, 76  
— inverted in Southern hemisphere, 76, 77  
— study of the, 86-91  
— how to find the "Maiden," 89, 90  
— "Butterfly," 90, 91  
— Falstaff's reference to the, 167  
— eclipse of, 181, 182
- Nicaragua, a starlit sky in, 166
- Night-skies very brilliant at Bournemouth, 64, 65
- North Sea tempest, 11-19
- North Sea, its mutterings after storm, 60
- North Star's altitude measured in fathoms, 49
- Oak trees and lightning, 118, 119
- Orion Nebula, 179-181  
— Belt of, 21, 179  
"Ossian" and green stars, 62
- Perseids, 170-173
- Perseus, 21  
— in August, 170
- Planets, scintillation of, 34-36  
— all visible between sunset and sunrise, 72  
— in daylight, 93
- Pleiades, 24  
— their visibility near horizon, 28  
— and nebulous matter, 83  
— did Shakespeare allude to them? 167, 168
- Pollux, 22
- Proctor, Richard A., *Voices of the Suns*, 161
- Rainbows in Kensington Gardens, 173  
— at Hartlepool, 173, 174  
— indefinitely distant, 174
- Rain, energy involved in its production, 149  
— from the south-east, 112, 113
- Rain-making experiments in New Zealand, 146, 147  
— — — Austria and Italy, 147, 148
- Reflectors influenced by temperature, 162, 163
- Richter's Dream, effect of its recital, 161, 162
- Sagittarii, Epsilon, excellent naked-eye observation of, 64  
— Eta, an opera-glass view of, 64
- Sagittarius, 21  
— and astrology, 38
- Salvage award to s.s. *Wolviston*, 47
- Saturn, 21, 22, 24  
— steady light of, 36

- Saturn, light-variation of its satellites, 97
- Scorpii, Lambda and Upsilon visible at remarkably low altitudes, 64
- Sculptoris, Gamma, seen with opera-glass from Bournemouth, 65
- Shakespeare and the "Seven Stars," 167, 168
- and Charles's Wain, 167, 168
- Shaw, Dr. W. N., on thunderstorms at the mouths of great rivers, 117
- — on the effect of gun-firing upon the weather, 146-149
- Sirius, 22
- its splendour, 27, 28, 32, 33
- in daylight, 95, 96
- in mid-March, 27, 28
- and halos, 107
- Sky in July, 20, 21
- of striking transparency, 28
- Spica in July, 169
- Spenser and the February Sun, 26
- Star Chart; an excellent record of work, 165
- Stars, faint, their light constancy, 153
- green, mentioned in "Osian," 62
- in daylight, 92-96
- rare brilliancy of, 28
- seen at low altitudes, 64
- their multitude, 164-166
- visible with the naked eye, 165, 166
- Stone-falls most prolific in May, 127
- Storm at Hartlepool, 11-19
- Summer, beauties of, 21
- an afternoon of, at Seaton Carew, 57, 58
- Sun, its winter journey, 26, 27
- in February, 26
- how measured in Dante's day, 49
- Logan's hymn to the, 56
- at midnight, 78, 79
- Sunset, beautiful, 29
- red, 113-115
- clouds, their formation, 164
- Tears of St. Lawrence (August Meteors), 171
- Temperature and reflecting telescopes, 162, 163
- The English Mechanic* and stars in daylight, 95
- Thunder, its audibility, 120
- Thunderstorms at river mouths, 116, 117
- in Straits of Magellan, 117
- fatalities from, 118, 119
- in California, 121-123
- Twilight Comet, 50
- Universe, the, and the Andromeda Nebula, 153
- Variable stars discovered at Flagstaff Observatory, 82
- Vega, steady light of, 64
- Venus, 21-23
- scintillation of, 35, 36
- rotation period of, 82
- in daylight, 95, 96
- crescent invisible to naked eye, 98
- a good naked-eye observation of, 98
- with a halo, 107
- Vulcan, the phantom planet, 158-160
- Wandsworth Common fatalities from lightning, 119
- Waterloo and rain, 146
- Weather and cats, 110-112
- portents, 101-109
- rhyme, 108, 109
- White's *Selborne* and glow-worms, 63
- Whitmell, C. T., on the distance of rainbows, 174
- Winter, some reflections on, 37
- Wolviston's* rescue of *Pavonia*, 47
- Yorkshire, south-east rains in, 112, 113

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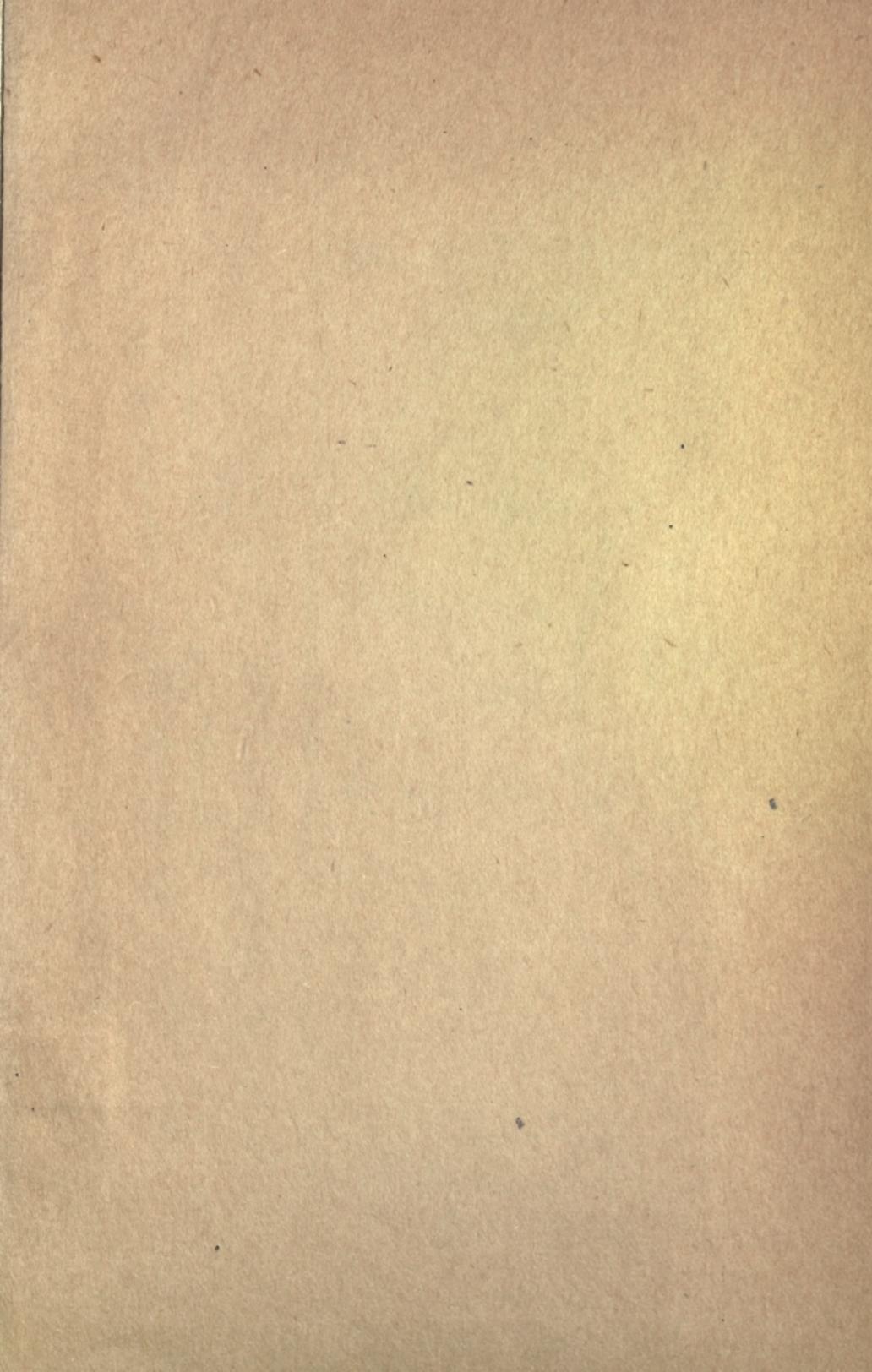
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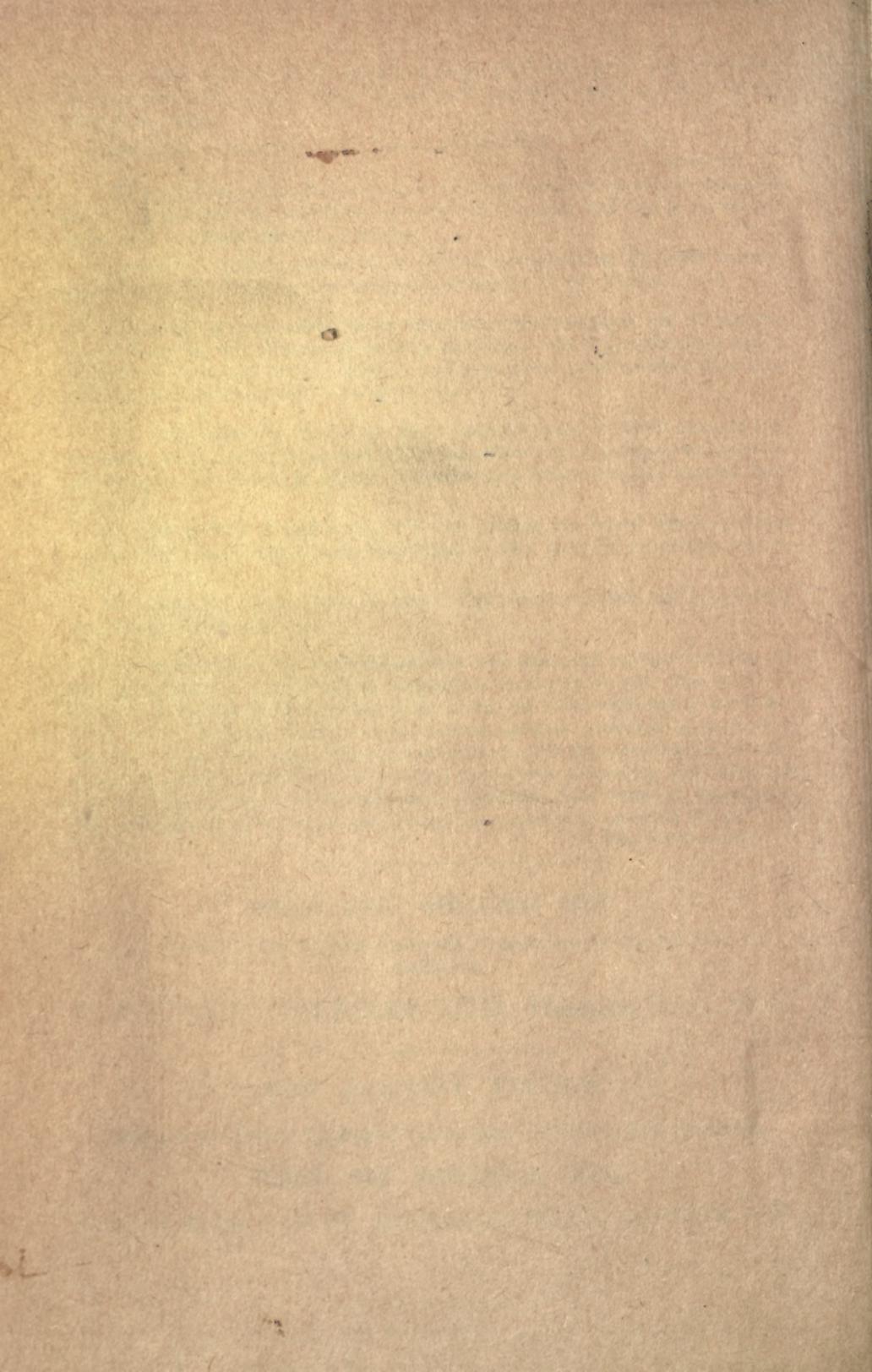
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