

reaches his early home." On the 22nd another man, who died suddenly, was in the same manner committed to his ocean grave.

Our letters of later date tell of the loyal reception and stirring events of the Australian visit; but most of this has been transferred to the English from the colonial newspapers. One thing we may notice, that the duke's "service dinners," of about a dozen guests at a sitting, astonished the colonists who heard of them, and elicited admiration at the cook's art, with materials so limited by the length of the voyage, and the absence of shore supplies. All that foresight and skill could arrange were certainly supplied for the voyage of the Galatea.

A few words in conclusion, about the picture of the Galatea, which forms the frontispiece to our monthly part. It represents the ship, not in the recent cyclone, but in a yet more fearful storm, which she encountered when under another command. She proved herself on that occasion a truly sea-worthy craft. It was one of those tremendous West Indian hurricanes so fatal to many a strong vessel, manned by many a gallant crew. Captain Maguire,* since dead, was the commander. It was a perilous ordeal, out of which the good ship came so severely shaken that it was for some time a question whether she must be left in these seas a shattered wreck, or risk the home voyage.† It was an anxious time for the commander. If assailed on the homeward voyage, could she outlive another storm? Fortunately the substantial safety of the hull was ascertained, and temporary repairs proved sufficient for the return, and the Galatea survived to become more than ever noted in the annals of the Royal Navy.

FAR-OFF VISION.

FROM Apia, Navigators' Islands, Mr. Trood has sent the following summary of his theory and experience as to far-off vision, in reply to the criticisms that appeared on his former paper in the "Leisure Hour." It will be remembered by many of our readers that Mr. Trood, like M. Bonniveau, formerly in the Mauritius, claimed the faculty of seeing ships and other objects long before they were visible to ordinary vision.

* The Galatea becoming historical, any little anecdote connected with her may, at any rate, like the following, be amusing. His royal highness's predecessor, an excellent and highly esteemed officer, had in him a rich dash of the impetuous and genuine Irish character. Once, when earnestly reproving a delinquent sailor, he crowned the lecture with the bitter reproach, "Worse than all, you are a disgrace to the flag you are flying under!" On another occasion, signalling an invitation to a colonial governor and his lady to dine on board, he was adding that he would be happy to receive the family and their governess (a very pretty woman) also, when one of his officers near him hinted that the message might possibly be misconstrued. "Indeed, truly," exclaimed the captain to the signal-man; "*belay the governess!*"

† Mr. Sear, the skilful and experienced chief engineer, was anxious about the machinery, and wished to know the state of matters below the surface. There happened to be a diving-dress on board, but no divers. One of his staff, a young assistant engineer, had been permitted, in calm weather, to disport himself in this panoply, and, somehow, a look towards him was cast in the emergency. But diving was no part of an engineer's duty, and the task was dangerous—so dangerous that the captain would not run the responsible risk of ordering it out of the ordinary line of service. Nor did the youth think it right to volunteer it in a foolhardy manner, but had it intimated to his commander that if he requested, or expressed a wish for it, he would at once equip himself and do his best. The result of his exploration appears in the following record from his captain, and entered as a memorandum at the Admiralty:—"Great credit is due to Mr. Jerdan, assistant engineer, for services rendered in examining the ship's stern and screw well, by diving. He went down in the diving-dress seven or eight times." To this recommendation it is probably owing that the diver was reapportioned to the vessel, with whose hull he was so well acquainted, has had the honour to accompany the royal duke, and received his farther promotion to engineer as rapidly as the rules of the service could allow.

The following is Mr. Trood's communication, which we give in full for the sake of those who take interest in the subject:—

I conceive that all clouds exhibit on their outline the outline of terrestrial objects.

Clouds above the horizon exhibit on their outline the outline form of objects above the spectator's horizon.

Clouds on, that is, touching the horizon, exhibit on their outline the outline form of objects beneath the spectator's horizon.

Such outline images appear at times to be reflected from cloud to cloud.

Clear weather, involving a condition of the atmosphere unfavourable to the formation of cloud, exhibits but few form-clouds of objects above the horizon; and the form-clouds of objects at a distance are consequently then less liable to be intercepted by such. Land and vessels at a distance are then indicated by their respective form-clouds, according to the condition of the atmosphere in their several localities. And, in clear weather, it sometimes happens that while objects at a distance of 300 to 350 miles are plainly pointed out by their form-clouds, objects much nearer, say 50 to 100 miles, give no sign of their existence; but usually I found that on a clear day every object within, say 300 miles, was for a few minutes, at some time or other during the day, indicated by its clouds, either in vraisemblance small black form-clouds, or jaunesemblance small yellow, etc., or blancsemblance small white, etc. (See "Leisure Hour," 1866, p. 486.)*

In a state of the atmosphere neither clear nor thick, only objects at a moderate distance, say 100 to 120 miles, can be made out; and, as the atmosphere is then favourable to the formation of cloud, their form-clouds will be larger and more extended, appearing in yellow or black masses (see "Leisure Hour," 1866), according to the hour of the day at which they appear.

In thick weather, the dense masses which fill the heaven wall in the horizon, and bear on their outline the outline forms of objects either above the spectator's horizon or else just beneath it.

Thus, in thick weather, the great number and size of the form-clouds of objects close to the spectator prevent him from perceiving the form-clouds of objects at a limited distance; while, in moderately clear weather, the form-cloud of objects at a moderate distance prevents him from perceiving the form-clouds of objects at a great distance. Also, in thick weather, the clouds just above objects above the horizon exhibit on their outlines, in a more marked manner than in clear weather, the outline forms of such.

Land at a distance is indicated to the spectator by round or pyramid clouds.

Vessels at a distance are indicated by clouds bearing on their outline the outline form of the said vessels, according to their position as regards the spectator; viz., whether broadside on or standing from or to him, etc. If a drawing of a ship or schooner in full sail be cut into relief, placed on a sheet of paper, and pencilled round, the rough outline form thus obtained will present a tolerably perfect resemblance to nine out of every ten vessel-clouds. If the vessel be only from forty to seventy miles off, there may be many such form-clouds on the

* May I point out some errors in the letters published in the "Leisure Hour," 1866 (pp. 485-6):—For "Bottineau" read "Bonniveau" (p. 485). For "at this port" (p. 486, line 22) read "on the south side of this island—Upolu." For "westward" (p. 486, line 54), read "eastward." For "about the same distance" (p. 486, 2nd col., line 53), read "various distances."

horizon at and over the spot where she is. Such form-clouds, though constantly changing, never wholly lose their resemblance to the object; and the two-masted or three-masted image (as the case may be) and bowsprit always emerge from each change of form, and declare distinctly the character of the object. Sometimes the form-clouds of both land and vessels at a distance form an angle with the horizon of 45° to 65° . I noticed, at night at sea, this peculiarity with a two-masted vessel, distant about fifty miles. We sighted her next morning. Her form-cloud extended one-fourth way to the zenith.

The best time for observations is a little before and after sunrise for objects to the eastward; and a little before and after sunset for objects to the westward. When the moon is near or at the full a good observation of objects to the eastward, at moderate distance, may be obtained just before her rising. And note particularly, all clouds that do not touch the horizon are valueless as indicators.

When success first attended my inquiry, I was sanguine that far-off vision might be turned to daily practical use by the navigator, but now doubt of this, unless an instrument can be invented to resolve the cloud distortions into the exact images of the objects. I yet hope that this discovery is destined to act an important part in future voyages of exploration.

In conclusion, it is well for me to remark that I have long since ceased to make regular observations. Unless, therefore, scientific men think the subject worth examining, and (either at the Mauritius, or some other place equally well suited, by its clearness of atmosphere, to the investigation) set on foot horizon-cloud observations, there is every reason for fearing that far-off vision will meet the same fate under my auspices that it did under those of my predecessor, Bonniveau, a hundred years ago; and that its vast and sublime phenomena, which open to science a new and unexplored region of useful research, will continue to pass unheeded before unseeing eyes.

THOMAS TROOD.

P.S. With reference to some doubts raised by Mr. Dunkin, of the Royal Observatory, (see "Leisure Hour," 1866, p. 512), I would submit to that gentleman—First. Although *vraisemblances*, *jaunesemblances*, and *blancsemblances* of land may proceed from change of temperature in the circumambient atmosphere of the land they shadow forth, yet it is unlikely that *vraisemblances*, etc., etc., of vessels are produced in this manner. This argument is supported by the fact that the size of objects appears to be a secondary matter in observation, —small vessels evincing themselves with sometimes greater distinctness than do islands equally distant, that are twenty to thirty miles in circumference. Secondly. Vessels seen by far-off-vision are not reflected by the face of the clouds, as in a mirror, but their presence is declared by each whole cloud. [While on this part of the subject, I may remark, however, that the leading features of near land sometimes appear to be reflected by the face of large clouds.] If, on a clear day, horizon-clouds appear in a direction in which there is no land within four hundred miles, they denote a vessel, and their outlines, not their face, will determine whether she has two or three masts, etc. Lastly. Many sailors can see what is called the loom of land and ships long before the latter appear to landmen; and in small ports, visited by few strange vessels, the residents, especially if nautical men, can generally tell, by the cut of particular sails, and other peculiarities of rig, the names of vessels that frequent the port, almost as soon as they heave in sight.

T. T.

Having submitted the foregoing paper in manuscript to Mr. Dunkin, he appends the following reply:—

The explanation given by Mr. Trood of the phenomenon of "Far-off Vision," as observed by himself and M. Bonniveau, is certainly very ingenious, and I have no doubt he is perfectly sincere in his conviction that the apparent indications which he has perceived in the form of the outline of clouds have originated as he describes. But I must confess that my mind is not sufficiently clear on the subject to believe the possibility of such an occurrence taking place at the distances which he mentions, from 300 to 350 miles. In a former note ("Leisure Hour," No. 763) I pointed out clearly that the small horizon-clouds "may indicate distant land, and can be explained by some of the fundamental rules of meteorological science." Of this there is no doubt whatever; but with regard to vessels this explanation would not account for the phenomenon described by Mr. Trood, because the radiation of heat from any vessel would be far too insignificant to form sensible cloud. Mr. Trood says that "vessels seen by far-off vision are not reflected by the face of the clouds, as in a mirror, but their presence is declared by each whole cloud." By this I am led to infer that the vessel-like cloud-forms are not produced solely by reflection, but that the cloud itself has in some measure originated by an influence which the vessel may have over the immediate atmosphere above it. Now this idea appears to me very unlikely, if not impossible. Again, granting that the origin of these "*vraisemblance* small black form-clouds" do arise from the influence of the vessel on the local atmosphere, such a phenomenon could not possibly be seen at a distance of 300 or 350 miles. I have taken the trouble to calculate what would be the apparent magnitude of an object seen 350 miles off. Let us suppose that the cloud-formed vessel is a mile in absolute length: its height above the surface of the earth does not alter our result. The image reflected on the retina of the eye of the observer situated at 350 miles distance would equal only about ten seconds of arc. In a powerful telescope, magnifying 150 times, this quantity would probably be no greater than a pea, while to the naked eye, looking towards the horizon, it would be scarcely visible, or if so to very acute eyes, it would not be much larger than a pin's point. But I have assumed in my calculation that the earth is flat, which we know for certainty is not the case; consequently, it is a very doubtful question whether the clouds localised at a distance of 350 miles can be seen under any circumstances so *far*.

Notwithstanding, however, my disbelief in the accuracy of this reputed "far-off vision," I have no hesitation in saying that the vision of Mr. Trood, and also that of M. Bonniveau, has been most singularly acute, and that they have been able to perceive distant objects before persons with ordinary sight. In my opinion the fancied vessel-like forms in the outline of clouds, "coupled with some happy coincidences of arrival, have somewhat deceived them." With the last paragraph of Mr. Trood's postscript I decidedly agree, an illustration of which I gave in my former note. It is a very natural circumstance that when people have been accustomed to use the eye for years for any special purpose, they should be enabled to view minute objects of which others have no visible perception. For example, as it is with the sailor accustomed to be on the look-out for distant objects, so it is with the astronomer, who at noonday is able to observe objects in a telescope, which would be invisible to the most acute eye of strangers, even when looked for through the same telescope.

E. DUNKIN.