but the artist has had sufficient courage to avoid the obvious expedient of simply having a blue sky without clouds. A comparison between this work and some of John Constable's famous portrayals of clouds reveals how close Herbert has approached to the standards set by that great artist. This picture is a masterpiece and one that any connoisseur would be glad to have in his or her collection.

Rather more sombre is a watercolour, on pages 38 and 39, of the Reclus Hut in which a party of seven, including Herbert, resided for a month while waiting to be picked up by *John Biscoe*. Here it is a gloomy day on the coast, and the contrast between the sea and the sky hardly exists from the colour point of view. But the clarity of the paint in the former and the haziness of the paint in the latter, achieved by washing, afford a profound contrast. The centre point of the picture, albeit almost on the right edge of the work, is the hut itself with three members of the party standing outside it. In this case it is the construction of the painting that is primarily of interest. It was an act of real artistic imagination to make the hut, stark in its simplicity, the focal point of the work but to place it in a marginal position. The figures are small and only one is in direct contrast to the snow but the artist has managed to convey an air of patient stoicism about them. They are simply standing around waiting for something to happen. This is a fine example of the total insignificance of man in the enormity of the Antarctic. There is a second painting, on pages 40 and 41, again a watercolour, depicting the 'rescue' of the party from Cape Reclus. This shows boats approaching the shore and Herbert's party waiting to greet them. This affords an interesting contrast to the first, which is essentially static, in that there is significant movement. However, the work is even more monochrome that the previous one, and this serves to accentuate the tension inherent in the scene.

When Herbert dealt with subjects that permitted a more impressionistic approach, he displayed equal confidence. An example is on pages 26 and 27 and is entitled 'Sunrise in Smith Sound.' This is a depiction of Avatak, his Inuit companion standing on a pressure ridge 'performing his own private greeting to the returning sun.' The colour contrasts in this picture are imaginative. He has introduced varying shades of purple and brown to convey a profound sense of distance and remoteness. But it was surely not mere coincidence, but an exercise in humility, that the figure of Avatak, gazing into the distance, has his pipe in his mouth!

The artist was, if anything, more competent in the ostensibly easier medium of pen and ink, and some evocative sketches are included in the book. The most obviously attractive of these is 'Rescued' indicating the happiness of one of Herbert's party on being relieved at the Reclus Peninsula, but there are several others of equal quality throughout the book.

When we come to oils we find similar mastery of technique. An example appears on page 41, 'Portal Point, last visit.' Herbert's palette is of necessity restricted — green is hardly necessary in the polar regions for example – but he manages to extract the maximum amount of contrast possible from it. Here is yet again a study of the insignificance of man. However, this reviewer trusts that he will not be regarded as churlish if he states his opinion that Herbert was perhaps more at home in watercolour, or pen and ink, or pencil and scalpel, than he was with oils. Certainly less confidence in composition is displayed in this medium, as is demonstrated in the last picture in the book, dated from 2002, and entitled 'Hunter and the narwhal' on pages 124 and 125. Here we have an Inuit in a kayak approaching a pod of narwhals in a flat calm sea surrounded by bergs. The predominating, almost the only, colour is blue and of a vividness that exceeds anything this reviewer has ever seen in the north. But from an impressionistic point of view the picture is stunning even though the execution is perhaps not as fine as in some of the artist's earlier works.

One cannot conclude a review of this book without commenting on Herbert's portraits of humans and of animals. He was a superlative painter of polar bears and several examples are presented. Of humans he was equally good, and the best examples are self-portraits, one of which appears on the cover. Of ships, too, his portrayals are excellent and maritime enthusiasts will find much to please them in this book. Vessels as diverse as *Fram* and *James Caird* are presented with verve and confidence.

The presentation of the book is excellent. It is in landscape format and is printed in a lavish, almost luxurious, style that is rare nowadays. This is reflected in the price, which is not, however, excessive for a book of this quality. All who appreciate art, who love the Arctic and Antarctic, and who would wish for a memento of the great man will want to possess it. (Ian R. Stone, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB 2 1ER.)

ROTER SCHNEE: ODER DIE SUCHE NACH DEM FÄRBENDEN PRINZIP. Petra Werner. 2007. Berlin: Akademie Verlag. viii + 189 p, illustrated, hard cover. ISBN 978-3-05-004432-3. €49.80.
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The literature on the history of the exploration of the polar regions is very rich, including, for instance, treatments of the history of the Northwest Passage, the Northeast Passage, and the Antarctic by numerous authors, available in different languages. However, few books in this genre have been devoted to the investigative history of one particular natural phenomenon associated with the polar regions, such as aurora borealis or 'red snow.' Petra Werner, a researcher at the Alexander von Humboldt Research Centre of the Berlin-Brandenburg Academy of Sciences (and also the author of several books of fiction) proves that such topics also deserve to be treated in monographs.

What made Werner, who had previously wittily analysed the working methods of Alexander von Humboldt

(Werner 2004), thoroughly investigate the 'red snow' discovered by John Ross in 1818 at Crimson Cliffs, a ridge of rocks near Baffin Bay (75°54′N, 67°15′W), one can only guess. Probably, Humboldt's keen interest in the topic and the attempts of his good friend and colleague, Christian Gottfried Ehrenberg, to map all possible reasons of the origin of red snow gave rise to a thorough investigation of this phenomenon. In any case, Werner's investigation is the first modern treatment of the subject.

It is amazing how many distinguished scientists of the nineteenth century, in addition to the two mentioned above, in one or other way treated the topic of red snow, among them naturalist William Hyde Wollaston, botanists Robert Browne, Christian Gottfried Daniel Nees von Esenbeck, Ferdinand von Meyen, evolutionary biologist Charles Darwin, physicists and astronomers Ernst Chladni and François Arago, palaeontologist Louis Agassiz, chemist Jacob Jöns Berzelius, and limnologist Carl Adolph Agardh. It can thus be seen that the solution of the questions about red snow was a key investigative issue in the natural sciences during the nineteenth century. According to Nees von Esenbeck, the elucidation of the phenomenon of red snow was 'one of the most important research problems of natural sciences' (quoted on page 3).

From the current book, however, it appears that the discovery of red snow and the investigation of its origin did not in the least influence the course of the exploration of the polar regions. Perhaps it would have been too much to expect, as the goals of nineteenth-century polar research tended to be mainly practical and political, such as the discovery of new areas in the Arctic and Antarctic and the attainment of the poles. At the same time, the discovery of red snow in Spitsbergen, as well as in the Pyrenees, the South American Cordilleras, the Alps, Russian Lapland, the northern Urals, and Greenland indicated that this phenomenon was wide spread throughout the world and was characteristic of areas covered with perpetual snow (page 32). What could cause such colouring?

Unlike botanists, zoologists, geologists, and astronomers, this question did not tend to arouse the interest of polar explorers. Thus this book is devoted, in the first place, to a thorough analysis of the views of the representatives of those scientific fields that ascribed the origin of red snow either to extraterrestrial dust, algae, fungi, or the geological base rock. Shortly after its discovery by Ross, Robert Brown stated that the red colour was caused by an alga. Although this conclusion was also approved of by several scientists, including Humboldt, Francis Bauer, Sören Christian Sommerfelt, and Augustin Pyranne de Candolle (pages 39–40, 123), it was generally not accepted in other academic circles. It was only at the beginning of the twentieth century that Johan Nordal Fischer-Wille, an algologist, finally conclusively proved that the red colour of snow was caused by an alga that he named *Chlamydomonas nivalis*. This view continues to be accepted today.

The discovery of red snow had unexpected effect on the development of science, as it gave rise to the search for other so-called 'red phenomena' in nature — such as red water and red rain — and to an explanation for their origin. That, in its turn, led to the investigation of the composition of dust in the atmosphere and an analysis of the origin of its components as well as of the protozoa and other elements found in it. This topic proved important to zoologists, geographers, and geologists, who could use the information obtained to help solve other research issues, such as the investigation of small organisms and the direction of winds, the role of the wind in the denudation of geological layers, etc. The leading investigator of atmospheric dust was Christian Gottfried Ehrenberg, who set up a network of observers in Europe, each of whom sent him air samples. He very soon also began to receive from throughout the world soil samples as well as ones from the bottom of the sea. Charles Darwin was very interested in the data on air samples (all in all 183 samples (page 112)). The 'collection of air dust' by Ehrenberg — containing 5,000 samples, 40,000 microscopic preparations, 300 drawings, and 800 documents — is held in the Museum of Natural History in Berlin (page 133). Ehrenberg, whose main concern was the determination of the representatives of organic nature, that is, unicellular organisms in the atmosphere, wanted to compile a 'world map of small organisms' on the basis of the material collected, but he did not manage to do so. Instead, he published thorough surveys on 'small organisms' of different regions of the world in German scientific publications, using the samples submitted (see the list on pages 156–159).

Thus, the studies into the origins of red snow greatly contributed to the analysis of the composition of the atmosphere and the investigation of the protozoa in it, that is, to solutions of considerably wider scientific questions than the study of a simple alga would normally have provided.

The present book differs from numerous strictly academic German monographs. It is more similar to a number of books by British historians of science, which have been published with a view to appeal to a wider public. That said, the text is concise, with numerous references, as is typical of German-language academic publications. In conclusion, the current book is wonderful reading material for those interested in the history of science, as it contains information not only on polar history but also on numerous other scientific issues of the nineteenth century. (Erki Tammiksaar, Estonian University of Life Sciences, Centre for Science Studies, K.E. von Baer House, Veski Str. 4, EE51005 Tartu, Estonia.)

Reference

Werner, P. 2004. *Himmel und Erde Alexander von Humboldt und sein 'Kosmos'*. Berlin: Akademie Verlag.

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