ACUTE PULMONARY EDEMA OF HIGH ALTITUDE

A condition which is known medically as acute pulmonary edema appears to occur at high altitudes—and this means to mountaineers—much more often than has been heretofore suspected. Since publication of brief non-medical notes in various mountain journals, and publication of one medical article in *The New England Journal of Medicine* (September 8, 1960), several dozen other cases have been reported to me. Many of these were probably pneumonia or bronchitis or some other infectious disease, but a handful have been classical pulmonary edema. These cases together with some forty others collected from the Andes will form the basis of a comprehensive medical article by Hultgren, Spickard and myself which should be published in the summer or fall of 1961.

The condition appears to occur when an inadequately acclimatized person works too hard at high altitude—usually above 10,000 feet. There is some evidence that it is more common in persons who have been acclimatized, go down to lower altitude, and come up again within a few days or weeks. It can affect any age, and is not dependent upon physical condition. In most of the cases the beginning has been rather abrupt, the course brief, and death has often occurred in forty-eight to ninety-six hours.

The symptoms are rather characteristic: weakness, unusual shortness of breath, tightness in the chest. Cough begins early and is at first irritative, but in a few hours becomes productive, and the patient coughs up large amounts of whitish frothy sputum, often pink tinged. He feels as though he were drowning in his own fluids, he must sit up to breathe, and loud bubbling noises are often heard as he tries to fill his lungs. The pulse is usually, but not always increased in rate, and the temperature often is elevated by a degree or more.

The condition might well be mistaken for pneumonia, especially by non-medical personnel, and it can of course be complicated by pneumonia. Even doctors would be hard put to it to be certain of the diagnosis of pulmonary edema.

Treatment is relatively simple, urgent, and effective. Antibiotics such as penicillin by injection or achromycin (or similar drug) by mouth should be given at once, not only in case this is true pneumonia, but also to prevent pneumonia. Oxygen should be given as soon as possible, by constant flow of 3-4 liters per minute. Pressure breathing—where the subject
breathes out against pursed lips, may be helpful. Injection of a diuretic such as salyrgan may be life saving. Morphine and atropine may be used, but it is not certain as to how valuable these are, for only a few cases have been given these drugs (which are very effective, however, in pulmonary edema due to heart disease).

Digitalis is probably of help but is a dangerous drug unless given by a doctor who understands it thoroughly, and is not recommended for use of non-medical personnel. Tourniquets applied to thighs for five to ten minutes are helpful also, but again should be limited in use to trained medical people.

Descent to a lower altitude should be attempted as soon as is possible. This means getting down several thousand feet with as little effort as possible. If the descent is very difficult, it may not be possible to bring the man down without aggravating the condition, and the party should rely on oxygen and the above measures.

The cause of the condition is not certainly known. We believe it is a disease of function, rather than due to infection, heart trouble or any organic disease. By this I mean that we feel it is due to failure of a normal healthy heart to take care of a load of blood greater than normal. As the heart fails in its job of pumping blood from tissues to lungs and back again, blood backs up in the small vessels of the lung. As blood accumulates in these vessels, pressure increases, and fluid is pressed out into the alveoli or breathing cells of the lung. Pulmonary edema is the result. We do not believe that occurrence of this condition means heart disease or even heart weakness, but further details are still to be explored.

Though I personally have not favored use of oxygen as a climbing aid, no matter what the altitude, I do urge that any party going to a high mountain—say of 15,000 feet or more—should carry medicinal oxygen along. The supply should be enough for one person for several days, and some member of the party should know how to use it, when to give it, and should watch over it.

To summarize: pulmonary edema is a condition in which the lungs fill up with fluid due to accumulation of blood under increased pressure in the capillaries of the lung. The fluid increases and ultimately drowns the victim—unless he is promptly and intelligently treated. The condition usually follows heavy work in an incompletely acclimatized person, and usually happens above 15,000 feet, though several fatal cases have occurred as low as 9000 feet. The symptoms are shortness of breath, weakness, cough, unconsciousness. It is easily mistaken for pneumonia, but is probably not due to infection or to any real disease process. Treatment consists
of antibiotics (in case it is pneumonia), oxygen by mask, diuretics, perhaps morphine, digitalis and tourniquets. Descent to lower altitude should be attempted early and fast.

The condition is probably much more common than suspected, has probably been the true cause of death in many cases called pneumonia, and should be known to all climbers and particularly to medical officers on all mountain trips.

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A SURPRISING QUOTATION

"There is an indefinite expectation of seeing something very strange, which however often it may be balked, never fails with me to recur on each successive attempt. Every one must know the feeling of triumph and pride which a grand view from a height communicates to the mind. In these little frequented countries there is also joined to it some vanity that perhaps you are the first man who ever stood on this pinnacle or admired this view." Would you guess the source?—Charles Darwin in Voyage of the Beagle.

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A NOTE ON MOUNT OLYMPUS, CASCADES

Following the publication in last year's A.A.J. of the early climbing records of Mount Olympus my attention was called by Dr. J. M. Thorington to the fact that in the 1932 and 1940 A. A. C. booklets Belmore Browne had included in his list, "1907: Olympus (first ascent)." This was puzzling, for Belmore would never have claimed anything he had not done; on the other hand his name does not appear in the detailed account by L. A. Nelson in The Mountaineer, September, 1907. Recently I had an opportunity to talk with John E. Doerr, Superintendent of Olympic National Park about it. He passed the inquiry on to his assistant, Charles E. Browne (not related to Belmore), who made the following report:

'According to Belmore Browne's article, 'The First Ascent of Mount Olympus,' in Recreation, 1908, 28:5, pp. 195-200, his party of five climbed Mount Olympus in the summer of 1907, some days before the party of eleven led by L. A. Nelson. In writing about their return from the climb he mentions this other party. 'In Geyser Valley we met a mountaineering club ascending the Elwha River for an attempt on Olympus. The main party failed on the big mountain owing to unfavorable weather conditions, and at the foot of Humes Glacier a young woman fell and was seriously injured. This shows the necessity of a rope in all serious climbing. When the main party returned, a small number of men remained and succeeded