FOUNDED BY

NEWS OF THE P.A.T.C. MOUNTAINEERING COMMITTEE 1916 Sunderland Place N. W. Washington 6, D. C.

Volume XV Number 10

October 1960

COMING EVENTS

The Mountaineering Committee meets each Sunday morning at Howard Johnson's restaurant, Western and Wisconsin Avenues, at 8 a.m. Bring lunch, water, and sneakers for climbing. A note is left behind the south east drain pipe so latecomers may know where we have gone. There will usually be a Sunday trip on the out of town weekends. Please do not phone the restaurant.

October 2 CARDEROCK, Md. Belay practice with Oscar.

9 GREAT FALLS, Virginia

Don't forget the first meeting of the fall at the clubhouse, 1916 Sunderland Place, second floor lounge. The talk for the evening -- <u>Mica Creek Revisited</u> --. This is a Sunday night and the meeting starts at 7:30. Come in your climbing clothes.

16 THURMONT, Maryland

23 STONEY MAN, Virginia -- Skyline Drive.

28- 30 THE HERMITAGE, Pennsylvania. The number of people the cabin holds is limited, and you must make reservations if you plan to go. Call Betty Johnson at Em. 2-4789

November 6 CARDEROCK, Maryland. Belay practice with Oscar. MEETING at Clubhouse. Our Chairman Bob Adams will have his pictures cn his summer trip ready by this time, we hope. Climbing clothes acceptable attire.

11-12-13 SENECA, West Virginia. Long Weekend. Call Bob Adams at Cherry 84523

20 GREAT FALLS, Maryland

26-27 OLD RAG Virginia. Food by individual car. Call Betty Johnson at Em. 2-4789.

December 4 CARDEROCK. If the weather is good we will have belay practice.

19

ALTITUDE ADAPTATION

by Dr. Rodolfo Lopez Kruger *

The surp Fochistion

These notes on conditions of life and adaptation to the altitude are intended to give the non-medical reader a basic knowledge of the causes and prevention of altitude sickness.

I would like to start by dispelling some commonly held false notions about altitude sickness, among them the one that altiplanic Indians never get it. Actually, the Indians had a name for it and a theory of its cause long before the Spaniards ever came to America. The Indians name "sorojchi", which means antimony, expressed the belief that the caus of mountain sickness was the inhalation of poisonous emanations from outcroppings of this metal frequently found among the high peaks.

Another source of confusion arises from the fact that there is great diversity in the tolerance of different individuals to the altitude, and that within the individual there is also great variation in tolerance to altitude depending on his physical condition, fatigue, nervous exhaustion, etc.

Gradual acclimatization combined with physical fitness permits a progressive tolerance to high altitude that is truly astonishing. Dr. C. Houston of Exeter, a famous mountaineer and investigator of this problem, together with several other members of his research team, was able to sustain a barometric pressure equivalent to 26,000 feet for several hours --- an altitude that for the untrained man is lethal after three minutes. This was achieved after months of gradual adaptation to progressively lower barometric pressure.

The cause of altitude sickness is decreased barometric pressure. In simple terms, this means that at 12,000 feet above sea level, we have above us that much less air. The decreased air pressure inside our lungs causes less saturation of our blood with oxygen, which is the only vital air component. The human body counterbalances the lower oxygen pressure of the inspired air by several modifications in the most important body functions.

As the barometric pressure decreases there is a corresponding increase in the frequency of respiration; associated with this there is an increase in the depth of respiratory motions at times taking the form of "periodic breathing" or runs of deep sighing breaths.

The heart and blood vessels respond automatically to the increase in altitude with more frequent heart beats; there is a quicker pulse rate, an increase in the heart output of blood per minute and the circulation time of the blood may be accelerated by dilation of the capillaries and arterioles, there may be changes in the blood pressure, but these are transient and relatively inconstant.

The blood itself undergoes rapid and profound changes to adapt itself to the newer demands; to be able to absorb more oxygen in the lungs the number of circulationg red cells is rapidly incremented by the outpouring of the reserves, usually kept in store in different places; later there will be an increase in the production of new red cells, to the level that is normal for that particular altitude. Hemoglobin ... will be more concentrated and thus enable the blood to carry more oxygen per volume and several biochemical changes occur in the acid alkali balance of the blood that permit more rapid exchange of oxygen and carbon dioxide at the capillary and cell level. .1

"Acute mountain sickness" is characterized by rapid pulse, panting, dimness of vision, buzzing of the ears and dulling of hearing, severe weakness and mental torpor, nausea and v@miting, pallor with lividity and coldness, and finally there may be loss of consciousness. Urgent medical treatment is required, based on the administration of oxygen, body rest, fluid balance and change to lower altitude.

The usual history for the more common chronic type of altitude sickness is that no discomfort was felt at first, even for several days or weeks. Then upon exertion -- a party, a heavy meal, a mild respiratory infection or all by themselves -- the symptoms of altitude sickness begin gradually with fleeting dizzy sensations, momentary dimness of vision on straightening after stopping, indefinite feeling of pressure in the chest and vague anxiety. A feeling of languor, lack of energy and loss of apetite usually follow. Frequently the morning after arrival in the altitude a severe frontal headache, felt as a pressure sensation in the temples, may manifest itself for the first time, tending to become more severe with the least effort. At times this will be followed by nausea and vomiting. A feeling of distention of the abdomen and discomfort, followed sometimes by colicky pains and diarrhea is common. Mental efficiency and capacity of concentration are noticeably reduced, and there is generally marked irritability and insomnia; the face shows an expression of dullness with bluish discoloration of the lips and ear lobes; the hands are cold and motions are clumsy with tremor and weakness. The sickness may be present for many weeks in a minor form without being recognized. In some cases a few days of rest and proper medication will be enough to overcome it; but in the great majority of cases, the doctor must make a careful search for the underlying cause of the failure of adaptation.

Failure "may be" due to a respiratory defect "such as" deformities of the chest, long standing lung desease with reduction of pulmonary capacity, surgical absence of one lung "and the common cold".

Very often people who have been told that they were "a little anemic" come to the altitude without any preliminary treatment. These people very frequently will develop the chronic type of altitude sickness because the body reserves of red cells already partially depleted are unable to supply the sudden demands of adaptation to the altitude.

It is consequently very important to have an accurate and thorough examination of the blood before taking a trip to the altitude. This should include determination of the number of red cells and hemoglobin content of the blood, as well as a search for evidence of the adequate functioning of the blood forming organs.

Again I will only mention those cases in which known organic heart disease should preclude coming to the altitude. Among these conditions are congenital heart disease in children. Long-standing high blood pressure and a history of previous heart failure or coronary disease are frequently the cause of serious trouble in newcomers. In general the normal heart will readily adapt to the increased demands of the high altitude; an increased pulse rate in the first days or weeks is a normal finding and occasional extra systoles or missed beats need not cause too much concern.

It is easy to understand that a person who carries an extra amount of weight over the mountains will be more susceptible to altitude sickness than a limber individual. It is almost a general rule that all over-weight persons lose a number of pounds during their first months in the altitude, through no effort of theirs. This is simply due to the increased strain on the body demanded by the adaptation process and is a welcome occurence because it eases the load on

October 1960

circulation and the heart.

Individuals with a history of glandular trouble, especially related to the Thyroid gland usually do badly in the altitude at least at first. Thyroid insufficiency is characterized by a low consumption of oxygen by the body and makes the patient more prone to altitude sickness.

Some individuals who have a tendency at sea level to bloating and distention of the abdomen due to faulty digestion, liver or biliary duct disease, and other intestinal dysfunctions, will experience distress in the altitude because of a distention of the intestinal content of gas, which in turn will cause respiratory and cardiac embarrasment. Normally a certain amount of digestive trouble is experienced. Frequently a flight taken after a heavy meal, after consumption of a large amount of carbonated beverages, or after a period of stomach or intestinal upset, will be followed by acute altitude sickness. As a general rule a light meal with little starch content and no gaseous beverages should be taken before a flight or trip to the altitude and during the first days or weeks of permanente it is better to stick to a low starch, low fat, simple diet.

Frequently patients have made themselves very ill through the use of self administered drugs under the presumption that their symptoms were due to some familiar condition like a common headache. In this case the headache is due to lack of oxygen, to which the brain cells are very sensitive. The usual aspirin tablet dulls the pain sensitivity of the nervous system to changes in the acid alkali of the blood; repeated doses will depress the heart and cause a drop in blood pressure. As a consequence, not only will the headache continue, but it will become associated with feelings of chest oppression, dullness of the head and even stupor. Frequently nausea and Vomiting due to the irritation of the stomach by the drug will follow and usually diarrhea completes the miscries and causes a hurried call for the doctor.

The use of barbiturate sleeping pills for nervousness and insomnia due to the altitude will frequently be followed by a feeling of dullness, incapacity to concentrate, irritability or severe depression plus the symptoms of cardiac consciousness and lack of air so familiar to every victim of altitude sickness.

In general the best drug of all is oxygen administered at low pressure, at a flow rate of no more than four to six liters per minute for intervals of fifte n to thirty minutes during the day and night in severe cases. Milder cases are relieved by rest in bed, relaxation and the use of stimulating drugs that improve the circulation and promote better ventilation of the lungs.

Finally, failure of the body to adapt itself to the demands of the high altitude, is more often due simply to the overtaxing of its resources. Though no particular organic defect or illness can be detected, I frequently find that people become ill or suffer needless distress because they fail to take into consideration the most elementary precautions that I have enumerated.

Especially during the initial period of acclimatization it is extremely important to remember that the body is being subjected to a continuous strain in order to function normallh. The heart beats more rapidly than it does at sea level, even at rest; the blood building organs are busy; anumber of changes are taking place in the lungs, heart and digestive organs to adapt themselves to new conditions of function.

Volume_XV Number 10

It should then be apparent that any unnecessary strain should be avoided during this period, including particularly heavy smoking which puts a definite strain on the lung capacity; meals should be taken at regular hours and followed by a rest period; the hours of sleep should bot be given up for too many parties.

In conclusion and to include a cheerful note, I would like to say a few good words for mountain climate; I find it especially good for children, who seem to thrive in it. They usually develop over average lung capacity, there is marked absence of Rickets and infectious diseases that normally take a heavy toll of youngsters -- either not present or so light as to be hard to recognize; this is especially true of Scarlet Fever, Streptococcal Diseases, Diphteria and the complications attending these infections. There are very few cases of Asthaa, Hay fever, and in general very few respiratory infections in adults, especially of the lingering types so frequently seen in low humid climates. Many People afflicted with low blood pressure, low thyroid function and that feeling of constant tiredness and easy exhaustion linked with Neurocirculatory Asthenia will do much better in the bracing mountain climate than they do at home. Altitude living can be healthy and good living.

> Dr. Rodolfo Lopez-Kruger The Mayo Foundation La Paz - Bolivia

* Notes for an address to the members of the United Nations Technical Assistance Mission to Bolivia, given in the office of the Special Representative of the Secretary-General in April 1954.

The above article although pertaining more to high altitude living should be of considerable interest to the mountaineer. It was made available through Harold A. Kramer.

* * * * * * * * * * *

WANTED

Persons who would like to spend a week or two in the White Mountains of New Hampshire for some backpacking and hiking. With proper leadership could also do some rock climbing. Leaving Saturday, October 8. If interested, call Bill Vetter during the day at Du 9 3996 or evenings Em 2 2133.

* * * * * * * * *

FOR SAIE

The Hiking, Camping, and Mountaineering Equipment bulletin by Art Lembeck is now avaiable through the Potomac Appalachian Trail Club, 1916 Sunderland Place NW Washington 6 D.C., for 50 ϕ a copy.

* * * *

UP ROPE is available for \$1.00 for twelve issues. Either send in the dollar or make out check to Betty Johnson.

EDITOR: Betty Johnson 4404 Jenifer St. #2, Wash. 15, DC. Emerson 2-4789 CHAIRMAN: Bob Adams ..7542 Livingston Rd. SE, DC 22. Cherry 8-4523 Vice CHAIRMAN: Bob Mole 28 Shady Nook Ave., Baltimore 28 Ri 4 1684 EQUIPMENT CHAIRMAN: Karl Edler 4112 Fairfax Ave, Landover Hills, Md. Sp.3 1693