

Anvers Island and the highest peak in the maritime peninsula. Skiing, we towed a sledge for three days along the flat piedmont to our route, Bull Ridge. We pushed progress for two days in poor light and bitter winds to camp at 6000 feet, roped up, as crevasses abounded on the ridge. With limited food, we headed for the summit in high winds. At least the snow conditions improved and we were no longer post-holing. The ridge merged with a steep face, too steep to solo; yet standing around to belay was out of the question. We kept moving to survive. We took a route under twenty three-story-high blocks. After innumerable false summits, at eleven A.M. on January 26, we revelled in victory on the summit. Graham Land lay before us, granite spires amid the waterway below.

VINCENT SCULLY, *New Zealand Alpine Club*

AFRICA

Egypt

Gebel Gharib. Gebel Gharib (1750 meters) is the highest of the northern Red Sea hills and rises a sheer 1500 meters from the gravel plains of the western Gulf of Suez. I made the first ascent of the south buttress solo on May 7. I found a lichen-covered cairn on the summit, probably erected by Bedouin ibex hunters. Two Nubian ibex were seen as I headed for the summit. There were exposed third- and fourth-class ledge systems, separated by easy fifth-class steps. The approach was made with a four-wheel vehicle up Wadi Kharm El Eyoun to a Bedouin camp about two hours' scramble from the base of the route. Its granite reminds one of that found on the Sinai Peninsula. Unfortunately, the rock is so shattered that potential routes on the sweeping arêtes and faces surrounding the summit would be somewhat tenuous. Slabs and domes on the lower nearby summits offer good prospects for solid fifth-class routes up to 500 meters in length.

DANA COFFIELD

ASIA

Italian Expedition to Tibet and Pakistan to Conduct Further Observations on the Altitude of Mount Everest and K2. (Professor Ardito Desio, who organized and was in overall charge of the group that undertook the new measurements, has kindly supplied the Editor with a report from which we print the following excerpts.) Renato Moro informed me that the Base Camp at 5300 meters on the Tibetan slope near the Rongbuk Monastery could actually be reached by motor vehicle. Therefore I decided to give precedence

PLATE 39

Photo by Dana Coffield

GEBEL GHARIB, Egypt.



to the measuring of Everest. On July 28 the expedition set off for Kathmandu. (It is assumed that the party traveled directly to the Everest Base Camp via the Kodari Road.—*Editor.*) The field party was made up as follows: Professor Alessandro Caporalli of the University of Padua in charge of geodesic measurements, Engineers Lionello Lavarini and Claudio Pigato, assistants to Caporalli, Dr. Attilio Bernini, physician, Dr. Mino Damato, journalist, Agostino Da Polenza, mountain guide, Kurt Diemberger, cine-photographer, Renato Moro, mountaineer, and Soro Dortei, mountain guide. I received no further news from them until on the tenth of August came the long-awaited telephone call informing me that the measurements of the height of Everest had been completed. All members were making preparations to leave for Pakistan. There was some difficulty in setting off for the Concordia Base Camp on the Baltoro Glacier. One of the helicopters managed to transport just the operators to near Urdokas and from there they continued on foot to Concordia. Professor Caporalli's team was able to complete measurements of K2 in only four days.

The equipment used consisted essentially of an electronic diastimeter theodolite and a pair of GPS (Global Positioning System) receivers of the latest generation. The theodolite allowed us to measure horizontal and vertical angles with the greatest of accuracy, allowing for atmospheric turbulence. The diastimeter with infra-red rays incorporated made it possible to calculate to a precision of some millimeters distances up to three or four kilometers. The new GPS technology is based on the use of the USA Navstar satellites, designed to provide a service for positioning in navigation. The satellites describe orbits at a height of 20,000 kilometers for periods of about 12 hours. These satellites transmit coded radio signals which, once they have been processed by the ground receiver, allow one to obtain, within a short time and from any point on the earth's surface, the exact location (longitude, latitude and altitude) of the instrument's antenna. When two of the receivers are used in conjunction, the accuracy of the measurements is far greater. The measuring is then done in two distinct phases. In the first phase, the altitude of the base in relation to the plane of reference is determined by observing the satellites. In the second, the altitude of the mountain's summit is determined by the theodolite, lining it up with different points. The absolute height of the peak is thus the sum of these two terms: the height determined by GPS and that obtained by theodolite, subject to appropriate corrections for the earth's curvature and atmospheric refraction. The most technologically innovative aspect of GPS lies in the fact that when two or more antennae operated at the same time, even at a relative distance of several kilometers, leveling and triangulation with precision become considerably more rapid and reliable than with traditional techniques.

It is time to let the figures speak for themselves. Let us begin with K2, which presents fewer problems. The height of K2, after various computer corrections, came to 8616 meters, plus or minus 7 meters. It is thus 5 meters more than the height obtained by Colonel Montgomerie of the Survey of India over a century ago. In addition to K2, our expedition measured another two peaks. Our figures are followed by the traditional figures in parentheses: Broad

Peak 8060m (8051m): Gasherbrum IV 7929m (7925m). As for Everest, the height arrived at from our measurements is 8872 meters, *plus or minus 20 meters*. This is 24 meters greater, therefore, than the figure previously considered the most valid.

ARDITO DESIO, *Italy*

First Ascents of Routes on Mount Everest, 1963-1987

COMPILED BY DEE MOLENAAR

<i>Year</i>	<i>Date(s)</i>	<i>Route</i>	<i>Nationality</i>	<i>Climbers</i>
1953	5/29	South Col, South Ridge	British, New Zealand, Indian	Edmund Hillary Tenzing Norgay
1960	5/25	Northeast Ridge	Chinese	Wang Fu-chou Chu Yin-hua Gonpa (Tibetan)
1963	5/22	West Ridge, Hornbein Couloir	American	Tom Hornbein Willi Unsoeld
1975	9/24	Southwest Face, ramp to above South Summit	British	Dougal Haston Doug Scott
	9/26			Peter Boardman Pertemba Mick Burke (?—disappeared)
1979	5/13	West Ridge Direct	Yugoslavian	Andrej Štremfelj Nejc Zaplotnik
	5/15	-ditto-	"	Stane Belax Stipe Božić Ang Phu (Sherpa)
1980	2/19	South Buttress	Polish	Andrzej Czok Jerzy Kukuczka
1980	5/10	Japanese Couloir, Hornbein Couloir	Japanese	Tsuneo Shigehiro Takashi Ozaki
1980	8/20	Upper North Face, Great Couloir	Italian Tirol	Reinhold Messner
1982	5/4	Southwest Buttress	U.S.S.R.	Eduard Myslovsky Vladimir Balyberdin
	5/4	-ditto-	"	Sergei Bershov Mikhail Turkevich
	5/5	-ditto-	"	Valentin Ivanov Sergei Ephimov
	5/8	-ditto-	"	Kazbek Valiev V. Khrishchaty
	5/9	-ditto-	"	Yuri Golodov Vladimir Puchkov Valery Khomutov
1983	10/8	Kangshung Face	American	Carlos Buhler Kim Momb Louis Reichardt