10. *Tschiamdo* (= Changiu), chin. Prov. Sikang, 31°09'N, 97°10'E, 3910 m (?), wohl richtiger 3230 m, Zeitabschnitt 1941—42, aus (10).
11. *Batang* (= Paan), 30°1'N, 98°56'E, 2685 m nach Stieler-Atlas, nach (11) 2687 m, chin. Provinz Sikang. I Juli 1927 — Juli 1932, sowie Okt. 1934 bis Jan. 1935, unveröffentlichtes Klimatagebuch der Missionarin *M. H. Duncan* (USA) mit Vorwort (19). Temperaturen: Maximum und Minimum an geschützter Stelle aufgehängt (Sixthermometer?), Bewölkung nur geschätzt (aus 0,1 heitere Tage + 0,5 wolkige Tage + 0,9 bedeckte Tage), Angaben jedoch inhomogen wegen offenbar schwankender Beobachtungsgrundlage. Die tägliche Niederschlagsmenge wurde in (19) in 0,1 inch geschätzt, im Jahresmittel aus 34 Monaten 953 mm; bei den bekannten Schwierigkeiten einer Niederschlagsschätzung erscheint dieser Wert von vornherein als unsicher, eher zu hoch. Die ebenfalls dreijährige Meßreihe II (nach 19) bestätigt diese Vermutung. Niederschlagshäufigkeit nach (19) aus 37 Monaten (Schnee und Regen), II nach (11).
12. *Taining*, chin. Prov. Sikang, 30°53'N, 101°29'E, 3496 oder 3690 m, Zeitabschnitt 1939—42, Temperatur nur 1940, nach (10).
13. *Sining* (früher Siningfu), 36°37'N, 101°49'E, 2380 m (?), 1937—40 nach (10), einige weitere Daten bei (5).
14. *Tatsienlu* (= Kangting), 30°01'N, 102°09'E, Höhe nach *Stieler* 2520 m, Niederschlagsmenge (8 Jahre) nach (11), Tallage.
15. *Sungpan*, 32°39'N, 103°34'E, 2856 m, 1941—42 nach (10).
16. *Zentraltibet*, neu bearbeitet nach den Expeditionen von *Sven Hedin* 1900—02 (6) und 1906—08 (7), aus dem Bereich 29—38°N, 78—90°E, Höhen zwischen 3900 und etwa 5400 m, Temperaturen mit 0,5°/100 m auf 4500 m reduziert, umfaßt 2—5 Jahre.
17. *Osttibet*, kompiliert nach den Expeditionen von Prschewalski 1872 f. (nach *Woeikof* 1896, vgl. 3), *Futterer* (1896) und *Filchner* (1904) — deren Beobachtungsdaten jeweils von *G. v. Elsner* (4,5) zusammengestellt wurden —, Raum 32—37°N, 92—103°E, Höhen zwischen 3400 m und 4800 m, Temperaturen mit 0,5°/100 m auf 4000 m reduziert, umfaßt 1—3 Jahre.
18. *Karakorum*, kompiliert nach den Expeditionen von *Ph. C. Visser* (16) und *Herrligkoffer* (17, 18) 1—4 Jahre; gilt für 35—36°N, 75—78°E, Höhen über 4000 m. Winterdaten fehlen.
19. *Pamirski Post*, 38°11'N, 74°02'E, 3653 m, hier nach *Köppen*, Handbuch der Klimatologie, Teil N2 (1939); Hochplateau im zentralen Pamir. Weitere Einzelheiten und Stationsdaten im Pamir siehe bei *H. v. Ficker*, Denkschr. Math. Nat. Kl. Akad. Wiss. Wien 81 (1908) und 97 (1919); die wichtigen Stationen Irkeschtam (39°42'N, 2850 m) und Chorog (37°29'N, 2098 m) ebenfalls bei *Köppen* (1939).
20. *Tian-Schanskaja*, 41°55'N, 78°14'E, 3605 m, südlich Alma-Ata in einem Hochtal des Tien-schan gelegen, Zeitraum Polarjahr 1932/33, vgl. (14).
21. *Omeischan*, 29°28'N, 103°41'E, 3092 m. Zeitabschnitt 1940—42 nach (10); vgl. hierzu auch 1932/33 in (11, 14). Die riesigen Niederschlagsmengen des Polarjahres 1932/33 (7625 mm, mit häufigen Tagesmengen über 20 cm, Hax. 332 mm) werden in dem neueren Zeitabschnitt nicht entfernt erreicht. Der allgemeine Witterungscharakter ist derselbe (219 Niederschlagstage gegen 234) wie in den Nachbarjahren, so daß der Wert recht fragwürdig erscheint (falsches Meßglas?).

THE GLACIATION OF YULUNGSHAN, YUNNAN, CHINA

by *Jen Mei-Ngo* *

With 3 Figures and 8 Plates

Die Vergletscherung des Yulungschan

Zusammenfassung: Der Yulungschan (5914 m), im Nordwesten der chinesischen Provinz Yunnan gelegen, weist eine Anzahl kleiner Kargletscher auf, von denen einige Zungen nach unten senden und Abbruchgletscher bilden, die ihr unteres Ende gegen 4500 m N.N. finden. Es wurden zwei quartäre Vereisungen, deren Endmoränen bei 3200 und 2800 m liegen, unterschieden. Sie werden hier vorläufig als Tali- und Litschiang-Vereisung bezeichnet und entsprechen wahrscheinlich der Würm- und Riß-Vereisung der Alpen. Aus der relativ kleinen Ausdehnung der Litschiang-Vereisung, der Frische der großen Verwerfungsstufe und dem Vorkommen tropischer Pflanzen in großen Höhen wird geschlossen, daß die Hauptheraushebung des Yulungschan wahrscheinlich im späten Quartär erfolgte.

Various high mountains of nort-western Yunnan nourish isolated glaciers among which Yulungshan is the most accessible. Yulungshan is situated at about 20 km. from Lichiang (26°53'N) the most important city of northwestern part of Yunnan Province, which may be reached from Kunming, the provincial capital, in three dasy by the newly built highway. The principal peak of Yulungshan, Sien-Tzu-Tou, has an altitude of 5914 m. or more than 3,000 m. above the Lichiang Basin. Viewed from the beautiful city of Lichiang, its snowy peaks rise like giants towering high above the clouds, about which local people cherish many romantic legends (Plate 1). Trending roughly from north to south, the mountain range is cut through by the Chinshachiang, forming a great gorge, known as Hu-Tiao-Chien or the Tigers' Leap (1), where the great river rushes by a series of waterfalls and cataracts in a narrow trench less than 100 m. wide above which tower precipitous cliffs more than 3,500 m. high. The gorge, more than 10 km. long, is undoubtedly the mightiest gorge in China and one of the grandest gorges of the world (Plate 2).

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*) The expedition, led by the author, was organized under the sponsorship of the Institute of Geography of the Academia Sinica (Peking) and Nanking University for the purpose of studying geomorphological division of Yunnan Province and providing materials for the development of water resources of the Yangtze Valley, one of the essential parts of the plan for the multi-purpose development of the Yangtze River Basin undertaken by the state. The field work was carried out in May and June. 1957. Besides the Yulungshan area, the famous river capture case of the Chinshachiang near Shiku was studied which will be the subject of another paper to be presented later. The party consisted of eleven members: *Prof. M. N. Jen, Mr. C. C. Liu, Mr. H. H. Hu, Mr. H. S. Bao, Mr. W. L. Yun, Mr. Y. F. Sung, Mr. P. W. Huang, Miss. F. Y. Wang, Mr. T. C. Han, Mr. S. Y. Ma* and *Mr. S. Y. Soo.*

Leader of the Yunnan Geographical Expedition and head of the Department of Geography, Nanking University.

The present glaciers and quaternary glaciation of Yulungshan were mentioned by many geographers and geologists, especially *H. Handel-Mazzetti, J. W. Gregory* and *P. Misch* (2). In May, 1957, the writer visited the region and made a detailed study of the eastern part of Yulungshan. He is indebted to all members of the expedition party for their cooperation and help in the field.

Physico-Geographical Environment

Yulungshan, about 35 km. long and 13 km. broad, consists of 12 high peaks most of which rise more than 5000 m. above sea level and are perpetually covered with snow. Geologically and topographically, the mountain range extends to the other side of the Chinshachiang and is known as Chung-ti-Sueh-Shan which also has small cirque glaciers.

In Yulungshan, the vertical zonation of natural landscape is apparent. On its eastern slope, the following zones of vegetation and soils may be generally observed (3). But in the narrow Chinshachiang Valley (about 1700 m. above sea level), especially on the northeast side of Yulungshan, the effect of foehn is strongly felt, resulting in a savannah landscape with many typical arid plants.

Altitude above sea level	Vegetation	Soil
2600—3150 m.	*PINUS YUNNANENSIS* with various sp. of *QUERCUS*	Mountain brown earth
3100—3900 m.	*ABIES spp., with shrubs* of *SINARUNDINAREA.* Below 3500 m., there are small areas of *PICEA LIKIANGENSIS* and *LARIX POTANINNII*	Mountain gray-brown earth, slightly podzolized
3800—4200 m.	Alpine meadow, largely of *FESTUCA* spp. and *COBRESIA* spp.	Mountain meadow soil
4000—4500 m.	Rock talus, with very scanty vegetation of a special type which has short stem and flower above the ground but long roots below the ground, their proportion being often 10 cm. : 100 cm., as *SAUSSUREA* spp. etc.	Mountain stony soil with thin (often 2–3 cm.) peat surface Soil
4500 m.	Snowline	

Geological Sketch

Yulungshan is a complex folded and faulted mountain massif with its axis of folding pitching south, so that from north to south strata of successively younger age are exposed (Fig. 1). The northern and higher part of the range is largely formed by limestone of Carboniferous-Devonian age which is pure, massive and more or less metamorphosed. In the southern and lower part of the range, Permian basalt is the principal stratum, the lower horizons of which probably flowed out under the sea and hence the frequent occurrence of interstratification of basalt and limestone (Fig. 2). The remarkable contrast of colour between whitish limestone crags and dark basalt cliffs leads the local people to call them „Pa-Cha" or white nowy mountains and „Na-Cha" or black snowy mountains, while peaks composed of both limestone and basalt are named „Yin-Yang-Shan" or black and white mountains. In the environs of Lichiang, considerable areas are occupied by Triassic limestone which forms lower ranges south of Yulungshan.

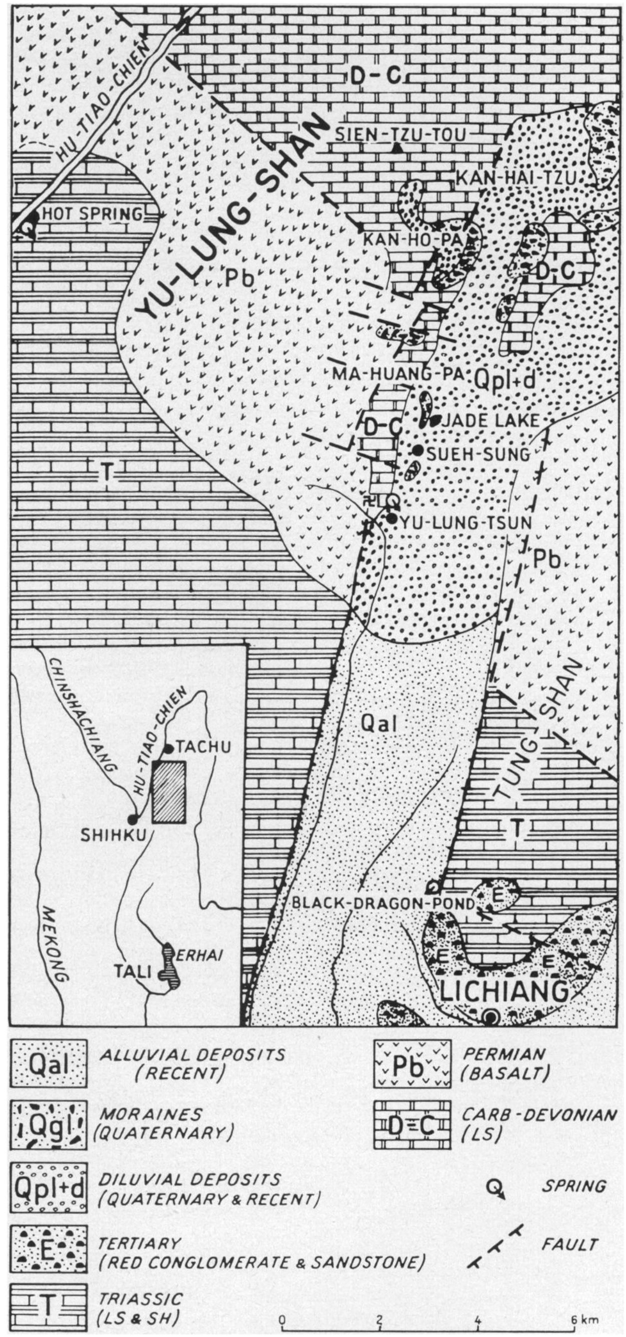


Fig. 1: A general geological map of Yulungshan

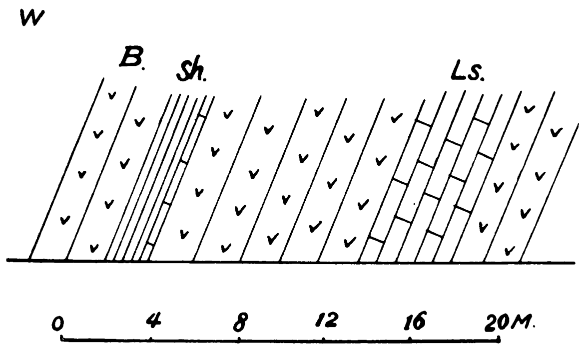


Fig. 2: Section W. of Yulung Tsun at 3170 m. Showing interstratification of basalt and limestone

The geological history of the region is interesting. During Triassic time, the region was occupied by a geosyncline where thick beds of marine origin (mainly limestone) were deposited. It was strongly folded and uplifted by Mesozoic orogenic movement (Yenshan) and since then remained as land when subaerial denudation reduced the area to a gentle, subdued relief, i. e. the so-called Yunnan Peneplain, which may be seen in the east of Lichiang at about 3000 m. above sea level (Plate 3). In late Tertiary, the peneplain was uplifted and uplifting was usually accompanied by tilting and block faulting. The principal faults trend in a N-S direction but E-W cross faults are also numerous. It is due to this late Tertiary faulting that the extensive longitudinal basin of Lichiang was formed. The basin was probably enclosed and occupied by a lake where thick Pliocene lacustrine sediments (more than 40 m. thick) were deposited. Numerous fault scarps on the east and west side of the Lichiang Basin prove its tectonic origin.

Differential movements and faulting were active after Pliocene. Near Kan-Hai-Tzu, on the east side of Yulungshan, a huge fault scarp trending N 35° E rises abruptly 1500 m. above the neighbouring basin (Fig. 3). The recent date of its formation is indicated by the freshness of the scarp which is but little touched by erosion. On the north-west of Yu-Lung-Tsun, a cross fault trending N 70° E cuts across an alluvial fan which is partly uplifted, forming a small faulted terrace about 8—10 m. high. As the alluvial fan is of late Quaternary age, the date of faulting must be very recent. The frequent occurrence of destructive earthquakes shows that the present tectonic movement of the region is still quite strong. According to historical data, five destructive earthquakes had occurred in the Lichiang area during the last 200 years (1751—1950) (4).

The Present Glaciers

In Yulungshan, above the altitude of 5000 m., where the topography is gentle enough to permit the accumulation of snow, a number of independent cirque glaciers are formed in which ice reaches a considerable thickness. These cirque glaciers descend down steep cliffs and their tongues stop at the middle of the cliff, forming cliff glaciers, the largest of which is the Sien-Tzu-Tou Glacier, its lower end reaching 4500 m. above sea level (Plate 4, Fig. 3). Crevasses and clear stratification are observeg in glacier ice (Plate 5). No valley glacier is found in Yulungshan.

On the sheltered lower slopes, at an altitude of about 4500 m., accumulation of a relatively thin layer of snow and ice often leads to the formation of small cirque glaciers. For example, in Sueh-Hai or the Snow Sea, there are four such small cirque glaciers the floor of which lies at 4400—4500 m. above sea level. On the eastern slope of Yulungshan, scattered patches of perpetual snow may be retained in a number of favourable places at 4200—4300 m. above sea level.

From these facts, it seems reasonable to infer that in eastern Yulungshan the topographical snowline lies at about 4400—4500 m. above sea level, which corresponds to the altitude of the floor of small cirque glaciers, while the climatic snowline is at about 5000 m., corresponding to the altitude of the floor of the main cirque glacier, the Sien-Tzu-Tou glacier. It may be pointed out that owing to the strong monsoon climate of the region, the snowline of Yulungshan is higher in summer than in winter (5).

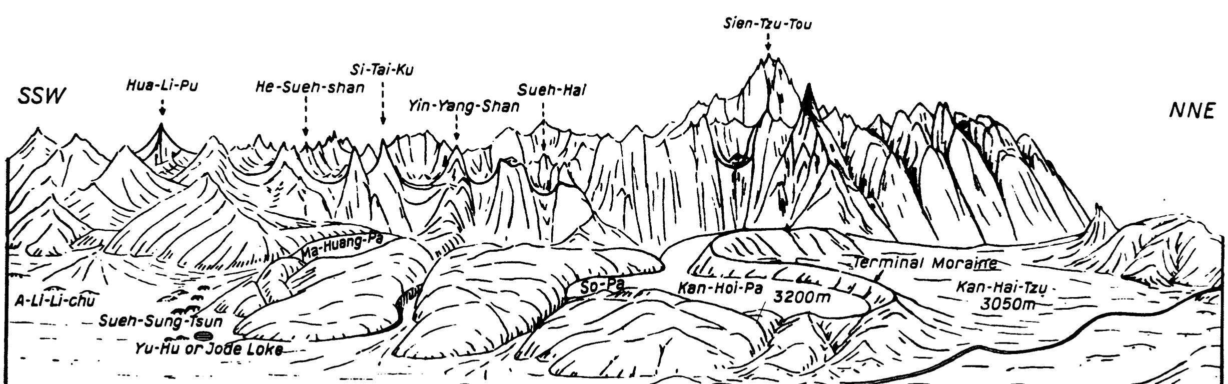
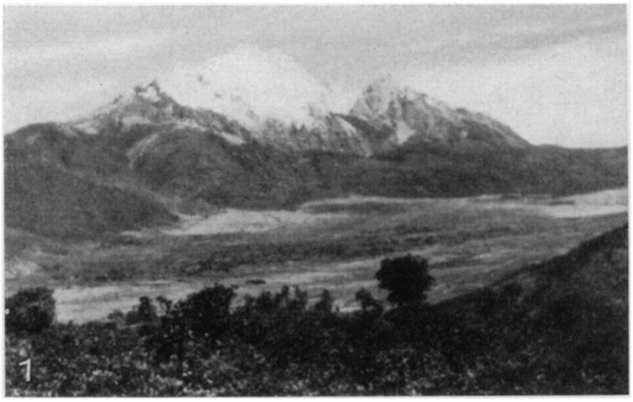
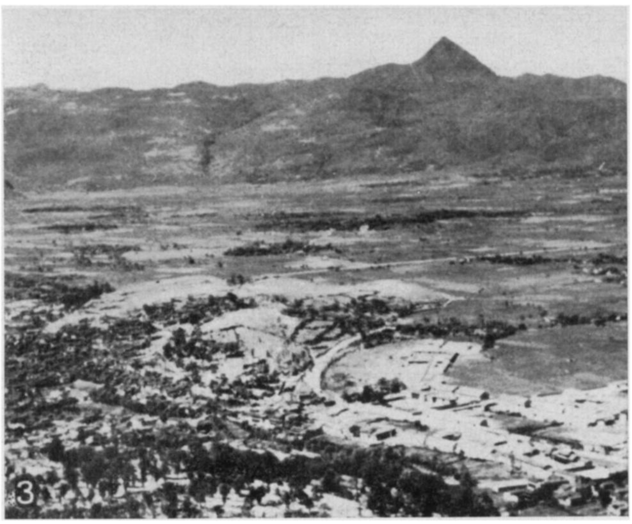
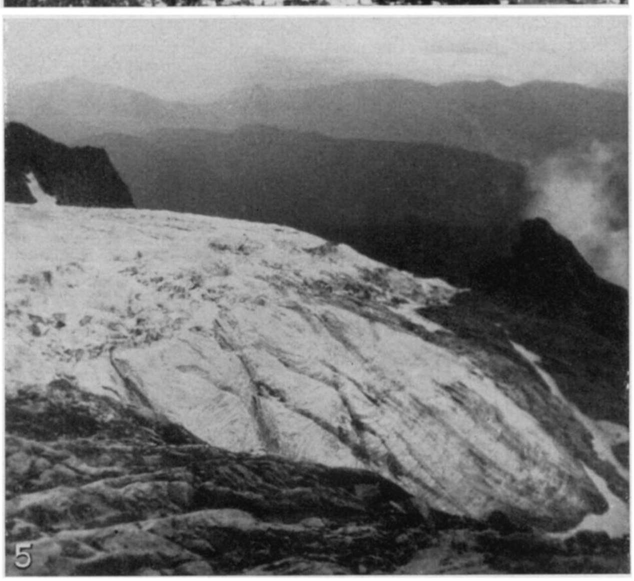


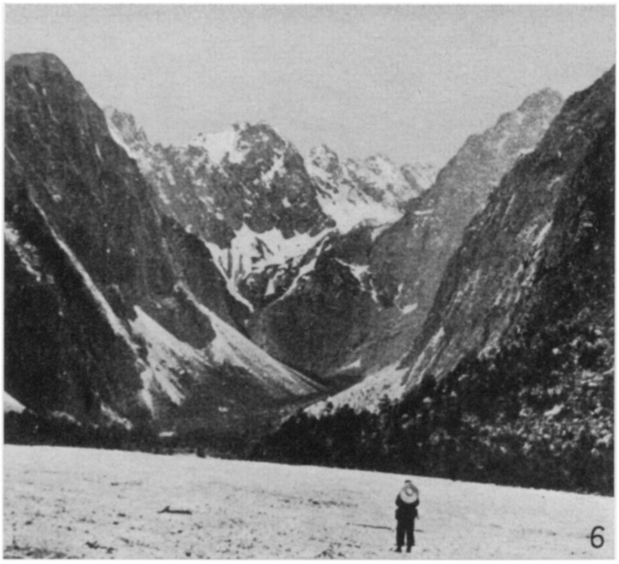
Fig. 3: The eastern part of Yulungshan (sketch by H. S. Bao)

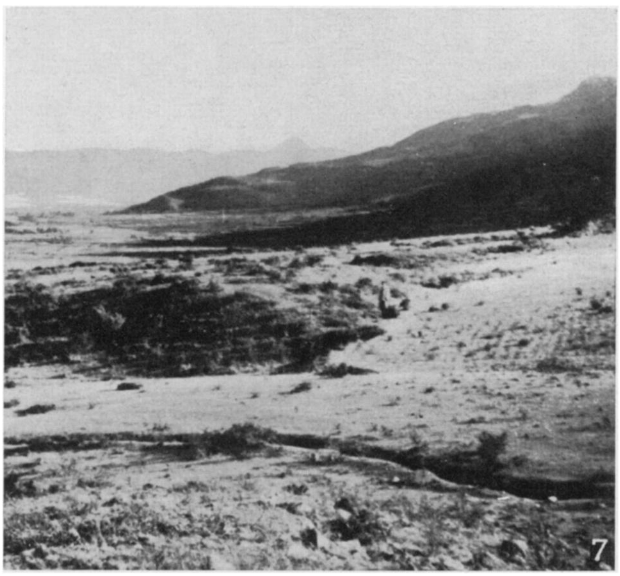






1. Yulungshan from Tungshan, Lichiang City
2. Hu Tiao Chien George from Tsing Lung Ton, looking downstream
3. Lichiang City and the Yunnan Peneplain at 3,000 m., from Tung Shan, looking east
4. Sien Tzu Tou cirque glacier, photo by Dept. of Biology, Yunnan University.
5. Glacier Tongue in Eastern Yulungshan showing crevasses and stratification in glacial ice, photo by Dept. of Biology, Yunnan University.





6. The Kan Ho Pa U-shaped valley, photo by C. C. Liu
7. The A-Li-Li-Chu terminal moraine, showing its crescent plan
8. Eastern Yulungshan, from Sueh Sung Tsun

Quaternary Glaciation

An the east slope of Yulungshan, at about 4000 m. above sea level, a number of beautiful cirques can be seen. At present, they do not hold any glacier or perpetual snow, but their cirque forms are preserved almost intact, as on Hua-Li-Pu, He-Sueh-Shan and Si-Tai-Ku. It is evident that they are not formed by the present glaciers but are products of the latest glaciation i. e. the Tali Glaciation. Many high mountains, carved out by cirques of the Tali Glaciation, often result in typical horns and comb ridges, the most interesting example being Si-Tai-Ku or Theatrical Peak, a perfect pyramidal peak surrounded by flat-floored cirques.

Cirques of the Tali Glaciation often descend by steep cliffs to U-shaped valleys. The Kan-Ho-Pa U-shaped valley is a most remarkable example of its kind. Its broad, flat floor is about 300 m. wide and its valley sides rise as sheer cliffs almost 1000 m. high. It is continued by another higher U-shaped valley hanging almost 500 m. above the former (Plate 6).

Moraines are well preserved in glaciated valleys of the Tali Glaciation. Near the mouth of the broad glaciated valley of Ma-Huang-Pa and So-Pa, terminal moraines form a series of low hills about 10—20 m. high, the terminal moraine of the Ma-Huang-Pa Valley is at 3350 m. above sea level and that of the So-Pa Valley at 3200 m. above sea level. A large terminal moraine blocks the entrance of the Kan-Ho-Pa Valley; it is at 3200 m. above sea level and rises as a continuous curved low ridge 50 m. high in its inner side but 150 m. high on its outer side. Owing to the blockade by the moraine, the present stream of the Kan-Ho-Pa Valley has no outlet and as a result, a local swamp is formed behind the moraine.

Terminal moraines are also seen near Sueh-Sung-Tsun at a lower altitude (2800 m.). They are, as a rule, more dissected, forming isolated little hills. An interesting example is the A-Li-Li-Chu terminal moraine which lies on the lower part of a huge alluvial fan south of Sueh-Sung-Tsun. It consists of seven low hillocks arranged in a crescent plan with its convex side facing east. The inner sides of these hillocks are much buried under the diluvial deposits (Plate 7). Their lower altitude and more dissected and much buried appearance present a distinct contrast to the less eroded moraines of the Tali Glaciation. It seems that they belong to an earlier glacial epoch which is here tentatively called the Lichiang Glaciation.

Glacial Periods and Quaternary History

In Yulungshan, three glacial periods are distinguished, namely the present glaciation, Tali Glaciation and Lichiang Glaciation. Judging from the height of the cirque floor, the snowline of the Tali Glaciation lies at about 4000 m. above sea level which roughly corresponds to the height of the Tali snowline in Tien-Chang-Shan (7). The present main glacier descends down to 4500 m., while the fronts of the Tali and Lichiang glaciers reached 3200 m. and 2800 m. respectively. As there are no interglacial deposits indicating distinct warm climate, it is quite possible that the three glacial periods of Yulungshan may represent only recessional stages of general glacial retreat and are, therefore, not real glacial periods separated by interglacial epochs.

During the Tali Glaciation, there existed large valley glaciers the lower end of which extended 1300 m. below the front of the present glacier. But tongues of the Lichiang glaciers reached only 400 m. farther down than the Tali glaciers. These facts throw light on the Quaternary history of Yulungshan. According to *Arnold Heim*, in Minya Konka, about 250 km. north of Yulungshan, the former glacial tongues reached 200—500 m. farther down than the present glaciers and the relatively small extent of past glaciation is explained by its late Quaternary uplift (7). But the case is somewhat different in Yulungshan. It seems that the mountain was still comparatively low at the maximum Quaternary glaciation and therefore glaciers were little developed in Yulungshan, hence the absence of older glacial drift in the Lichiang Basin. The much greater extent of the Tali glaciation as compared to the present glaciers indicates that uplift of the mountain was essentially completed before the Tali glaciation. The relatively small extent of the Lichiang glaciation may be explained by the fact that the general cold climate of the Pleistocene ice age was here nearly counterbalanced by its lower position at that time. Thus, the great differential uplift which gave the mountain its present height may be dated as between the Lichiang and Tali glaciation, i. e. about the middle Quaternary. This conclusion is supported by the fresh appearance of the great fault scarp near Kan-Hai-Tzu and the occurrence of tropical plants mixed with alpine types. According to Prof. *C. Y. Wu* (8), many typical plants of tropical rain forests and tropical monsoon forests are found in Yulungshan at a high altitude and they, by gradual adaptation to the cooler climate, assume peculiar dwarfed forms. For example, *WENDLANDIA*, a typical tropical plant, is found near Ta-Chu at 3000 m. above sea level as a dwarfed species, *W. ALPINA*, which is only some 10 cm. high. *STROBILANTHES* and *PENTAPANAX* are also found in the coniferous forest of Yulungshan. These facts may be explained by the formerly lower altitude of the mountain, by its comparatively recent date of uplift and by the lack of glacial destruction (in the lower part of Yulungshan, during the maximum glaciation, glaciers were essentially confined to valleys). The great recent uplift caused the formation of huge alluvial fans so notable along the eastern foot of Yulungshan (Plate 8).

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(1) *C. P. Fitzgerald*, The Tiger's Leap, Geogr. Jour., vol. 98, 1941, pp. 147—53. According to *S. C. Hsu*, the Kinshachiang in the narrowest part of Hu-Tiao-Chien is only 30—60 m. wide (new Tectonic Movements in the Kinshachiang Valley, The Peoples' Yangtze, 1957, No. 11).

(2) *H. Handel-Mazzetti*, Ergebnisse der Expedition Dr. *Handel-Mazzettis* nach China, 1914—1918. Neue Aufnahmen in N.W. Yunnan and S. Setschuan, Denk. Akad. Wiss., Wien XCVII, 1921, pp. 257—268.

J. W. Gregory and *C. J. Gregory*, The Geology and Physical Geography of Chinese Tibet and its Relations to the Mountain System of South-eastern Asia, Phil. Trans. Royal Soc., London, Ser. B, vol. 213, 1925, pp. 227—29.

P. Misch, the Geology of Lichiang, manuscript.

(3) Vertical zones of vegetation partly based on the work of Department of Biology, Yunnan University. See Department of Biology, Yunnan University, Handbook to Botanical Work of Yulungshan, 1957.

(4) Annals on Materials of Earthquakes in China, vol. 2, 1956.

(5) The annual precipitation of Lichiang is 1,011.6 mm. (average 1943—1950), of which only 12.5 mm. or 1.25% of the total falls in winter. *R. Peattie* mentions that in the mountains along the upper Mekong, the winter snowline is 5180 meters while in summer, it is only 4270—4570 meters (Mountain Geography, 1936, p. 49).

(6) *W. Credner*, Observations on Geology and Morphology of Yunnan, Geol. Surv. Kwangtung and Kwangsi, Spec. Pub. No. 10, 1932.

(7) *Arnold Heim*, The Glaciation and Solifluction of Minya Gongkar (also known as Minya Konka), Geogr. Jour., vol. 87, 1936, pp. 444—454.

(8) Oral communication from *Prof. Wu*, Institute of Botany, Academy of Red China.

DAS ENDE EINER POLITISCHEN GEOGRAPHIE OHNE SOZIALGEOGRAPHISCHE BINDUNG

Peter Schöller

The end of a political geography without links to social geography

Summary: Otto Maulls "Politische Geographie" published in 1956 is a retrogressive step in a number of ways compared to this book of 1925 with the same title, which was a systematic treatment of this topic. It is out of date in its basic concept, and scientifically untenable; the number of mistakes is great, that of half-truths unmeasurable; political resentment is dangerously linked with misjudgements and geopolitical prognoses. The doctrine of the state as a "Space organism" and its application to the world situation of the present, though historically based, but used purely from the aspect of power politics, forces the facts into a strait-jacket rather than helps towards an understanding. This book means the end of a political geography without ties with social geography.

For the future work in this field the breakdown of this outdated kind of political geography can do nothing but good. What matters today is a deepened insight into the interrelations between economic structure, social structure, type of state and further also an understanding of the three dimensional circulations within the countries. The foremost task is to grasp analytically within a dynamic region — a concept freed from the aspect of visibility — the forces which shape politics and those which emanate from the state, and to integrate them into a cultural geographical synthesis.

Als im Jahre 1925 *Otto Maulls* stattlicher Band „Politische Geographie" erschien, konnte die Wissenschaft trotz mancher Bedenken im einzelnen anerkennen, daß hier der diskutable Entwurf eines ordnenden Systembaus dieser geographischen Disziplin vorlag. Das Werk war seinerzeit in Anlage und kulturgeographischer Ausrichtung auch deshalb notwendig, weil es dem schon hier und da einsetzenden geopolitischen Dilettantismus und den propagandistischen Tendenzschriften, die sich auf „geographische Grundlagen"