The batholiths of Minya Gongkar and Lamoshé Chinese Tibet

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With 3 figures.

As already described by L. VON LOCZY in his classical work[1]), the high Front Ranges of Eastern Tibet towards Szechuan are made of granite and gneiss. VON LOCZY considered them as of azoic age. The writer[2]), leading an expedition of Sunyatsen University of Canton, in 1930—31, found *extensive contact metamorphism* of the adjacent sedimentary rocks, especially all along the W-side of Minya Gongkar Range (fig. 1).

Not only are the schists intensely metamorphosed over a width of 50—500 meters from the contact with the granite; they are also traversed by numerous offshoots of the granite in the shape of dikes and veins. Furthermore, big inclusions of metamorphosed sedimentary rocks are found in the granite (Djaze Gongkar).

East of the *Batholith of Minya Gongkar* which forms the highest peaks (Minya Gongkar 7700 meters[3]), Djaze Gongkar 7200 after measurements by Prof. ED. IMHOF), is the great *Batholith of Lamoshé*, called after its highest peak 6150 meters. These two batholiths are separated by a narrow zone of schists which will be called as the Zone of Tatsienlu. Similarly to the schist zone between the Alpine massives of Aar and St. Gotthard, the zone of Tatsienlu has been eroded out in the shape of longitudinal valleys and saddles.

The batholith of Lamoshé has a thickness, SE of Tatsienlu, of 20—30 km. or more, and widens therefrom towards North, while

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[1]) L. v. LOCZY, Reise des Grafen Széchenyi in Ostasien. Wien 1893.

[2]) ARN. HEIM, The Structure of Minya Gongkar, Preliminary Sketch. Bull. Geol. Soc. China, Vol. XI, No. 1, Peiping 1931, and —, Minya Gongkar, Forschungsreise ins Hochgebirge von Chinesisch Tibet, Erlebnisse und Entdeckungen. With 3 pl., 147 phot. and 25 fig. in text. Hans Huber, Bern-Berlin, 1933.

[3]) This is one of the highest, if not the highest peak of a granitic batholith of our globe.

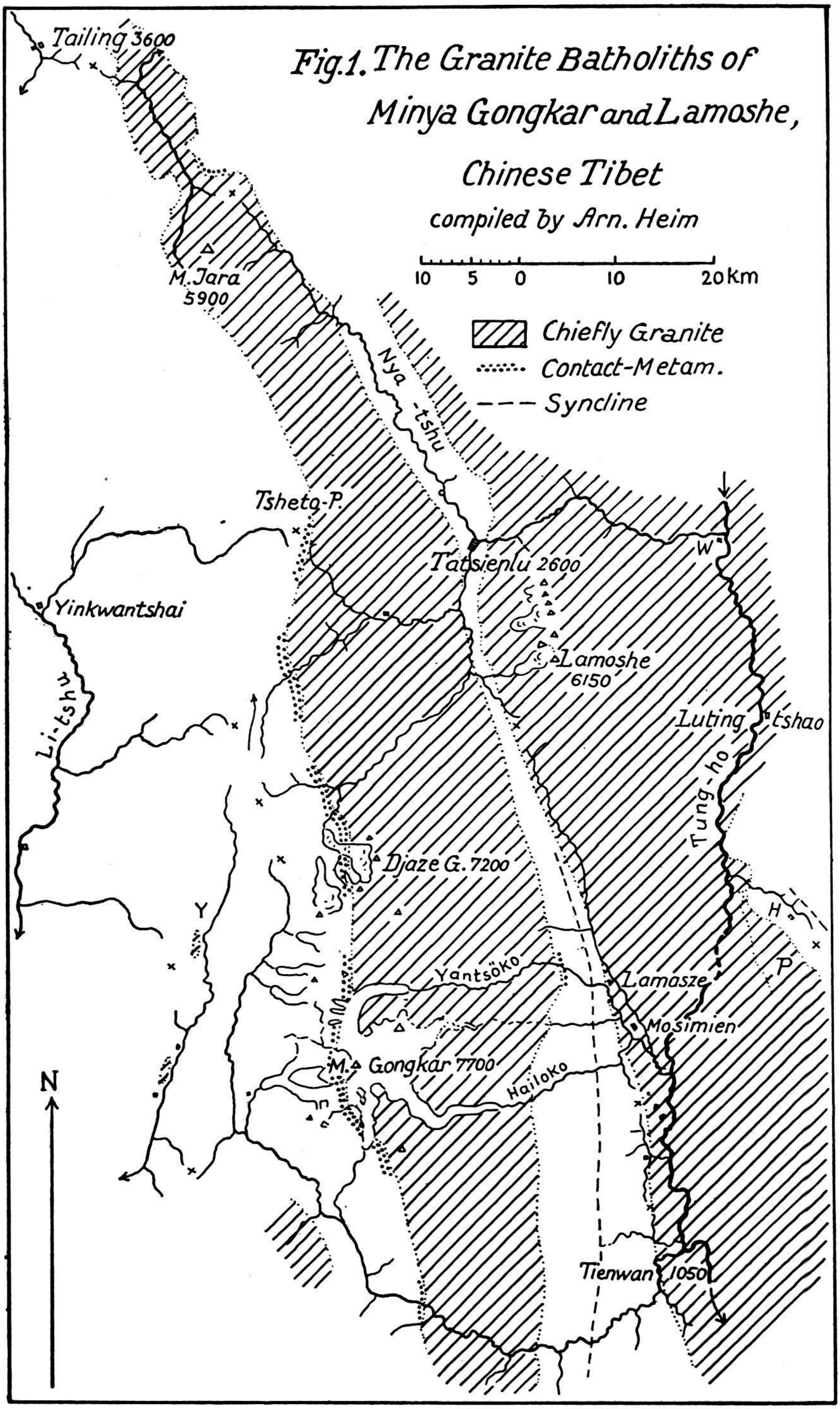
Fig.1. The Granite Batholiths of Minya Gongkar and Lamoshe, Chinese Tibet
compiled by Arn. Heim
10 5 0 10 20km
Chiefly Granite
Contact-Metam.
Syncline
Tailing 3600
M. Jara 5900
Nya-tshu
Tsheto-P.
Tatsienlu 2600
Yinkwantshai
Lamoshe 6150
Li-tshu
Luting tshao
Tung-ho
Djaze G. 7200
Y
H
P
Yantsöko
Lamasze
Mosimien
M. Gongkar 7700
Hailoko
Tienwan 1050
W
N

that of Minya Gongkar, of little over 20 km., in contrary thins out in this direction. North of Mount Jara, the latter pitches so that the adjoining schists and sandstones from both sides begin to cover the cristalline nucleus of gneiss.

The gneiss seems partly to be a true gneiss made by compression of formerly solidified granite, partly to be fluidal granite, the schistosity and fluidal folds being made by compression during cooling.

The *age* of the intrusions could not be determined directly. In the schists, neither VON LOCZY nor another observer since has found determinable fossils, although Helminthoides and Fucoides like those of the Alpine Flysch are frequent. We thus can only say that the granite ranges are younger than azoic. As deducted from the morphology and from the accompanying parallel synclines of Cretacic Red Beds (fig. 2), the writer thinks that the batholithic intrusion is relatively young.

Besides the two great mountain making batholiths, numerous smaller granitic intrusions were found in the great schist zone of the peneplain of Chinese Tibet W of Minya Gongkar Range.

Also on the eastern border, as already known by VON RICHTHOFEN and VON LOCZY, igneous rocks exist in great extension. But they are of another type: chiefly red granite porphyry showing no more signs of compression and lamination, and thus of apparently younger age. Indeed, East of the village Hualingping, the granite porphyry cuts off the limestone with variegated shales of triassic age, and even seems to be younger than the Alpine folding of that region (fig. 2).

Morphologically, the batholiths of the Tibetan Front Ranges form a great contrast to the peneplain of Chinese Tibet with its general level of 4500—4700 meters. However, looking more closely, it is neither the tectonical compression of the sedimentary series nor their easier weathering which has caused alone the outstanding feature of the two main batholithic ranges. Indeed, on the W-side of the granite of Minya Gongkar, numerous peaks reach elevations of 6000—6500 meters although they are formed exclusively of the schist series (fig. 3).

If we furthermore consider that the great plateau of Tibet could not have been peneplained at its actual level, and bearing in view the intense actual erosion, we come to the conclusion that the high batholithic front ranges, after having been partly modelled already at lower levels, have been lifted up in quaternary time together with the great peneplain. The actual phase of erosion is characterized by intersection of the peneplain while the general uplift still seems to continue. It is counterbalanced by the subsidence of the great low plains with their lakes of China.

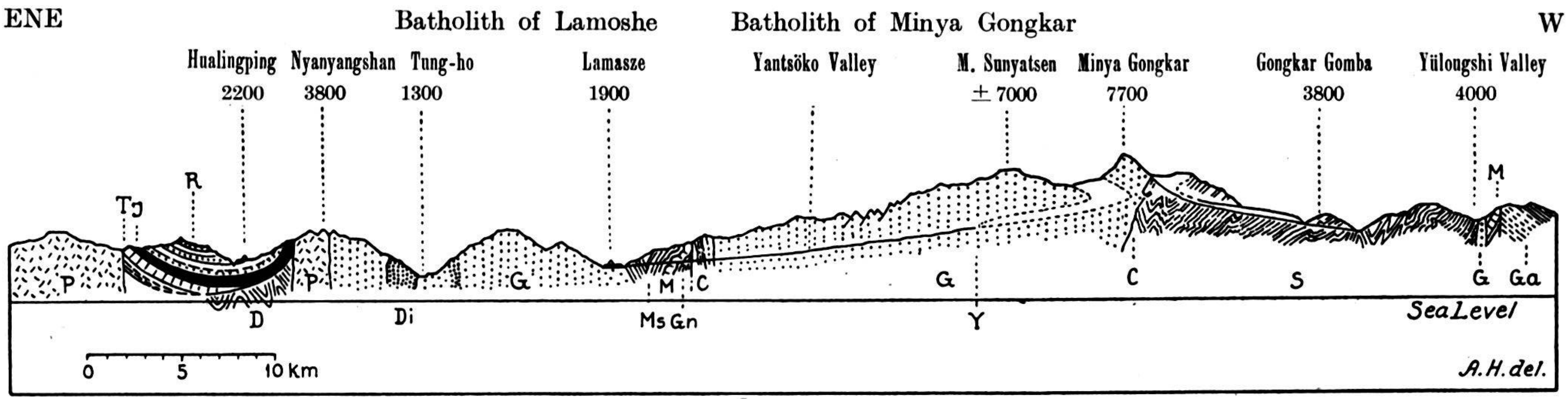

Fig. 2. *Section through the batholiths of Minya Gongkar and Lamoshé.*

Topography: Y = end of Yantsöko Glacier.

Igneous: G = granite with basic dikes, partly gneissic; Di = diorite; P = red granite-porphyry.

Metamorphic: Gn = gneiss; M = marble; Ms = mica schist and phyllite; Ga = black sedimentary rock with garnet covered by phyllite; C = zone of contact metamorphic schist and quartzite.

Sedimentary: S = schist and sandstone (Flysch); T = limestone and variegated marl, triassic; J = black coal bearing sandstone, lower jurassic; R = Red Beds, chiefly sandstone, cretacic.

The origin of the forces which have erected the immense Tibetan plateau *including* the high mountain ranges after the lateral compression still is one of the great unsolved problems of geotectonics.

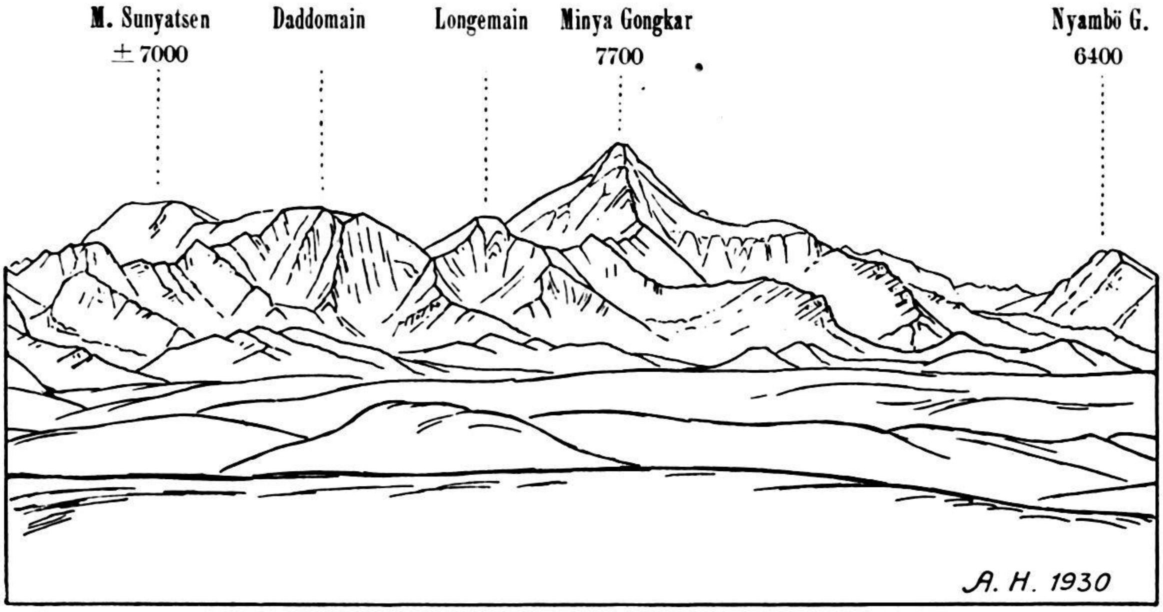

Fig. 3. View of Minya Gongkar from NW (Gaji-la), showing the Tibetan peneplain of 4500 meters in foreground, the magnificent granitic ice-peaks of Minya Gongkar and Mount Sunyatsen in the back ground, while the other high mountains are made of schists.

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