

(3) the state of preservation of human and animal remains, that the Gujarat microlithic culture is far older than that of Mohenjodaro. Of course, further evidence is necessary, and this may be had when detailed examination is made of animal remains, such as the exceptionally huge rib and shoulder blade, which appear to belong to certain animals, now extinct in Gujarat.

With regard to the comparison of the Gujarat microlithic culture with the European mesolithic or early neolithic there is no stratigraphic evidence yet available, except the meagre data from Mysore. However, attention may be drawn to certain features ... such as roundish pierced hammer-stone or mace-

head with the hole splayed from above and below, bone tools, absence of pottery, etc. ... of the Gujarat microlithic culture which can be compared to the European microlithic culture, without implying culture contact or even contemporary in time.

1. *Nature*, March 31, 1945, p. 386, cf. also *Nature* February 10 1945, p. 185. 2. *Indian Art and Letters*, 1936, pp. 35-41. 3. Presidential Address, Section of Anthropology, 29th Science Congress, Baroda, 1942.
4. *Studies on the Ice Age in India and Associated Human Cultures*, pp. 275-78. 5. Even the remains of sub-recent fossil horse, dog, camel, and bovid discovered by Mr. D. N. Wadia, were, as he kindly informs me, very friable and difficult to extract from the ground, 6. *Antiquity of Man*, Vol. I, 9. 8.

## THE OCCURRENCE OF *PARROTIA JACQUEMONTIANA* DCNE. IN THE PLEISTOCENE OF KASHMIR

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### INTRODUCTION

AMONG the photographs of the Karewa fossils sent by Dr. R. R. Stewart to Dr. H. de Terra in 1938 and later published by the latter in his memoir (see de Terra and Paterson, 1939, pls. 53, 54), one photograph (loc. cit., pl. 53, fig. 3) illustrating two leaves of *Parrotia Jacquemontiana* Dcne., was reproduced under an incorrect name of *Quercus dilatata* Lindl. It may be recalled that Dr. Stewart under whom the author was working during 1937-1939 on de Terra's collections from the Karewa (Pleistocene) deposits of Kashmir (Puri, 1939), sent to de Terra at his request twenty photographs and a preliminary list of the fossil species, so far identified by me, to show that the work on this material is in an advanced stage. But these photographs, together with the incomplete list of species, were published by de Terra in his above-quoted memoir (Puri, 1940), without any reference to me. The object of this note is to illustrate and briefly describe for the first time the fossils hitherto referred to *Quercus dilatata*, under the correct name of *Parrotia Jacquemontiana*, a large Himalayan shrub of the Celastraceæ.

### DESCRIPTION

*Parrotia Jacquemontiana* Dcne.

The fossil leaves (attached to a twig) illustrated in Fig. 1 were collected by Dr. H. de Terra, the leader of the Karakoram Expedition to India in 1932, from the Karewa deposits, exposed in a stream-bed, near Liddarmarg (alt. 10,600 ft.; lat. 33° 48'; long. 74° 39'), a temporary encampment of Kashmiri shepherds, on the northern slopes of the Pir Panjal Range. The leaves, which were embedded in a blackish-grey clay, that splits fairly neatly along bedding planes, are rather poorly preserved and do not show finer details of venation. The leaf-lamina, which is somewhat obovate or nearly oblong in outline, is narrowed at the base and has an acute apex. The margins are irregularly and sharply toothed.

The venation is strict-pinnate and reticulate, it consists of a fairly broad midrib and 5-7 pairs of secondaries, which are about half as thick as the midrib, and diverge in an alternate manner at angles varying from acute to

slightly obtuse. Some of the laterals bifurcate near the margins. The tertiary and finer reticulations are not well preserved but such

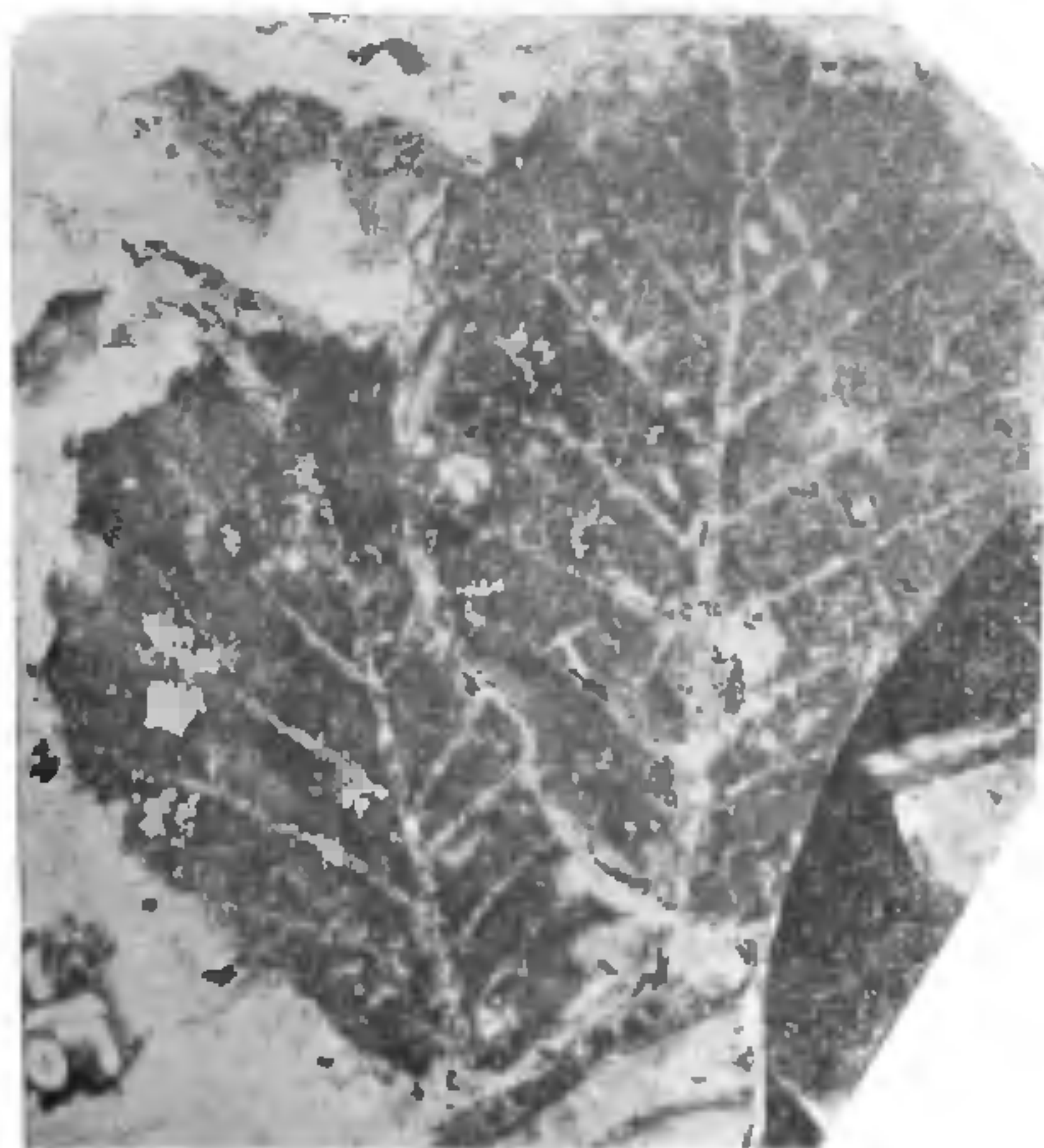


FIG. 1

as can be seen resemble closely those of living leaves of this species (Fig. 2). Organic matter of the leaf, too badly cracked to yield a good cuticular preparation, is present in both the leaves.

In shape, size, margins and details of venation our fossils are identical with *Parrotia Jacquemontiana* Dcne. (Fig. 2), a large shrub of the Western Himalayas. They are altogether different from *Quercus dilatata* (Fig. 3), under which they were placed by de Terra apparently by a mistake.

Number of specimens: Two only.

Occurrence: Liddarmarg, at 10,600 ft.,

Pir Panjal Range, Kashmir.

Collector: H. de Terra, 1932.

Reg. No. of figured specimen: Loc. 3L 36,



FIG. 2

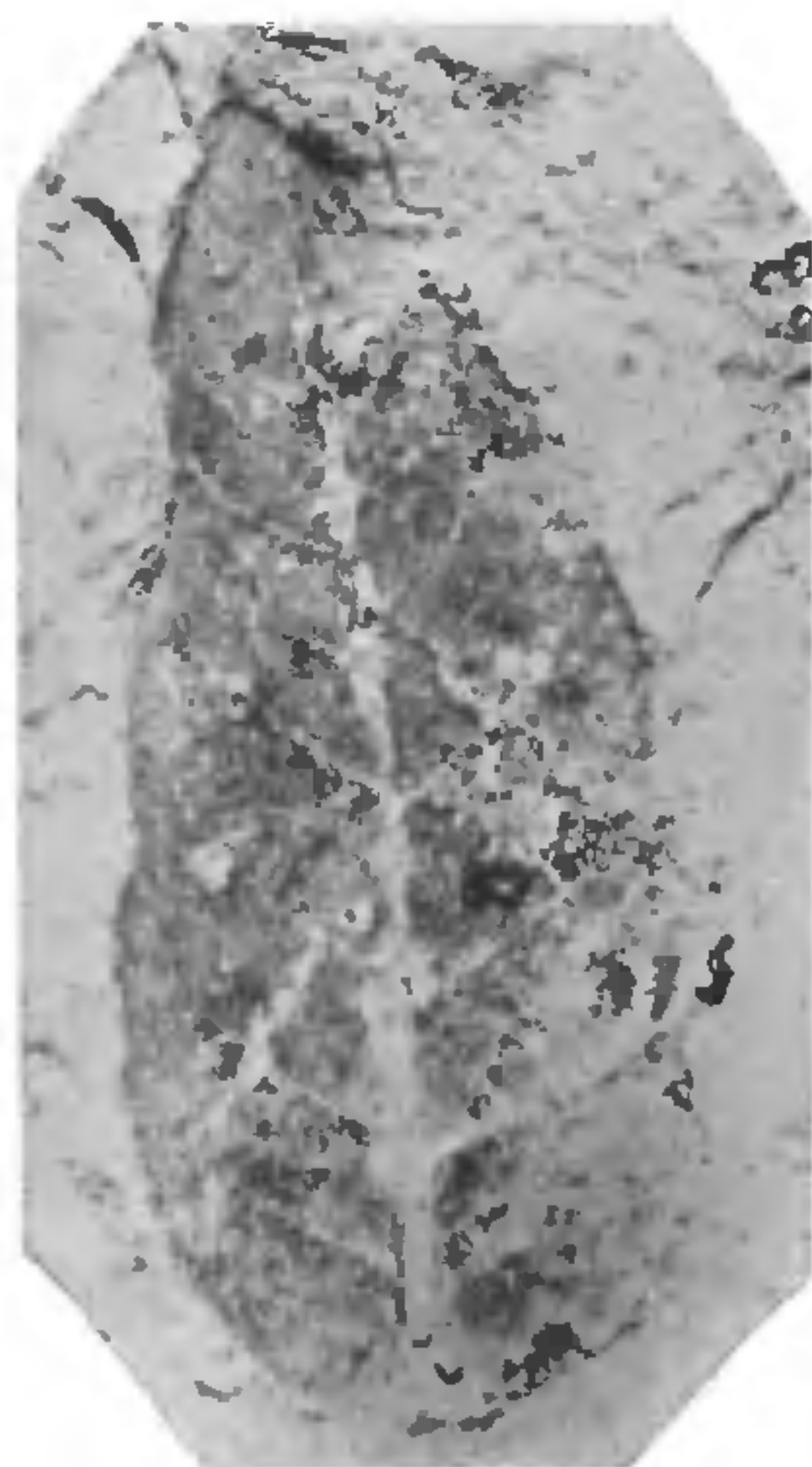


FIG. 3

#### MODERN DISTRIBUTION OF THE SPECIES

*Parrotia Jacquemontiana*, popularly known as the "Himalayan witch-hazel", is a large deciduous shrub of the Western Himalayas, which grows in mountainous country, westwards from Jumna, at the altitudes of 3,000 to 8,500 ft. In the Kashmir Himalayas, especially towards the eastern end of the valley, it is gregarious in forests of *Cedrus deodara*.

In the moist deodar forests of the Kagan Valley in Hazara, *Parrotia Jacquemontiana*, which is very abundant, occurs in association with *Viburnum nervosum* under a canopy of *Cedrus Deodora*, *Pinus excelsa* and *Quercus dilatata*. Similar forests with *Parrotia* forming a thick undergrowth occur on drier aspects in the Chamba and Baspa Valleys, but in the Murree Hills, it prefers moist localities. According to Champion (1936, p. 240) the Kagan Valley forest "is typical of forests in which the tall shrub *Parrotia* forms a dense undergrowth unfavourable for deodar generation". On the northern slopes of the Pir Panjal Range, where *Cedrus* forests are already so poorly represent-

ed Sher Singh (1929) considers *Parrotia* "a dangerous competitor of deodar in wet places". The same author while explaining the absence of deodar forests from the northern slopes of the Pir Panjal remarks that a high humidity resulting from a greater snow-fall in these regions creates unfavourable conditions for the growth of deodar. This contention of Sher Singh finds support from the fossil evidence, which I propose to discuss elsewhere.

In the dry temperate mixed evergreen forests of Kilba, Upper Bashahr Division, *Parrotia Jacquemontiana* occurs in association with *Rhus succedanea*, *Olea cuspidata*, *Zanthoxylum alatum*, *Artemisia maritima*, *A. vulgaris*, *Daphne oleoides*, *Rosa Webbiana*, *Berberis* spp., *Lonicera angustifolia*, *Abelia triflora*, *Sophora mollis*, *Celtis australis*, *Acer pentapomicum*, *Quercus*, *Ilex*, *Cedrus Deodara* and *Pinus gerardiana* (Champion, loc. cit., p. 254).

The Kashmir distribution of the species with which we are specially concerned is chiefly restricted to the valley proper where shrubby plants of *Parrotia* ascend to an altitude of about 6,500 ft. on the Pir Panjal.

The wood of this shrub in Kashmir is said to possess certain miraculous properties; sticks of *Parrotia* are often found in the hands of Kashmiri hill-tribes men to guard them against snakes, which are believed to be repelled by an aroma coming out of its wood.

#### CONCLUSIONS

A comparison of the past and present distribution of the species provides further evidence in favour of the theory that the Kashmir Himalayas have been uplifted by at least 5,000 to 6,000 feet after the deposition of the Karewa lake beds (see Puri, 1943, 1945, 1945a, 1946) at the level of the valley (about 5,200 ft.). These youngest deposits of the valley were bodily dragged by the Pleistocene orogenic on the neighbouring mountains where they lie tilted, sloping towards the valley, being unconformably overlain on the solid bed-rock.

The testimony of other fossil species, which have been discovered from this locality also points in the same direction (Puri, 1943, 1945, 1945a).

In the end, I wish to record my indebtedness to Prof. B. Sahni, F.R.S., for helpful criticism.

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5. —, "The occurrence of *Woodfordia fruticosa* (Linn.) S. Kurz., in the Karewa deposits of Kashmir, with remarks on changes of altitude and climate during the Pleistocene," *Ibid.*, 1943, 22.
6. —, "Some fossil leaves of *Litsaea latuginosa* Nees. from the Karewa beds at Liddarmarg, Pir Panjal, Kashmir," *Ibid.*, 1945, 24, No. 3.
7. —, "The genus *Quercus* in the Karewa deposits of Kashmir, with remarks on the oak forests of the valley during the Pleistocene," *Proc. Ind. Acad. Sci.*, 1945 a, 22 No. 4.
8. —, "Fossil plants and the Himalayan uplift," Accepted for inclusion in the *Jyengar Commemorative Volume*, 1946.
9. Sher Singh, "The effect of climate on the conifers of Kashmir," *Ind. For.*, 1929, pp. 189-203.