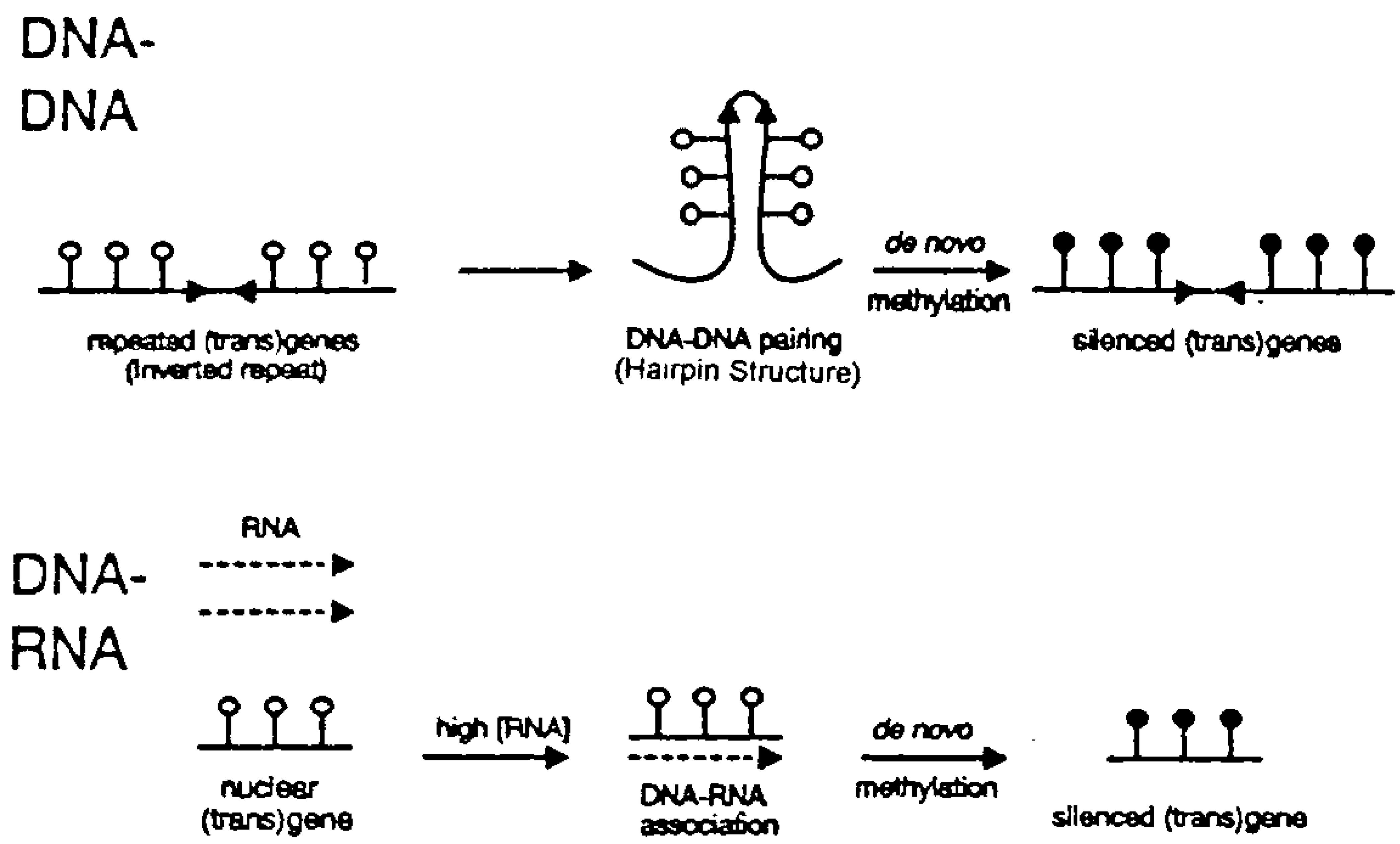

Figure 1. Hypothetical models of nucleic acid interaction involved in transgene silencing (Reproduced from ref. 7 with permission).

methylated probably through DNA–RNA pairing. The above observations were extended further to plant gene suppression involving DNA–RNA pairing which possibly triggers *de novo* methylation.

How do plants recognize the transgene as a foreign element and why do they have a tendency to suppress the homologous gene? It is well known that plants recognize an invasive DNA as 'foreign element' because of different CG contents[7] and like other living organisms, the plant cell also tries to eliminate the foreign body by activating its defense mechanism, which involves DNA methylation. DNA methylation serves as a useful tool in plants against the viral multiplication and also to prevent expression and spread of some transposable elements.

How can one overcome the transgene silencing? Gene silencing can be checked successfully firstly by using a drug named 5-azacytidine which is a modified cytosine base, incorporated during DNA replication. This drug is added in tissue culture medium during regeneration of the transgenic plant. Secondly, single copy gene insert can be selected among the transgenic progenies. However, further research is required to combat with this undesirable problem encountered during transgenic plant research.

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The India–Asia collision warps and thaws Tibet's bowels

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The Himalayas, along with the Tibetan Plateau, formed as a result of a classic continent–continent collision that took place about 50 million years (Ma) ago between India and Asia[1], is an uniquely elevated region of the Earth. The colliding boundaries of the two continents, forms today, the well-known Zangbo Suture Zone which coincides with the Yarlung–Zangbo river valley. The complex geological structure of the region has given rise to considerable debate among the earth scientists trying to interpret its orogenic evolution. According to some of them, the Indian plate, along with the crust and mantle below, is sliding underneath the Asian Plate, while a few others believe that the two plates are colliding head-on; and these tectonic processes are still active. Whatever be the mode of plate movements here, they have warped the colliding faces and pushed the crust deep down and created features, quite unique for the lithosphere of this plateau. For example, the region has an anomalously thick crust (almost twice the normal continental thickness), and an unusually high amount of heat flow. Earlier geophysical surveys have indicated that the unusual crustal thickness here is due to convergence during the collision of the two continents[2], while the abnormal heat flow has been attributed to the existence of molten granite at a depth of 10 to 20 km[3].

During the last couple of decades, this warped and contorted region had attracted a few international teams of geoscientists who undertook surveys to evaluate its geology and tectonic evolution. The latest to carry out such joint studies, is a team of scientists from USA, Canada, Germany and China. They undertook detailed geological and geophysical investigations to bring out an indepth profiling of Tibet and the Himalayas and advance existing

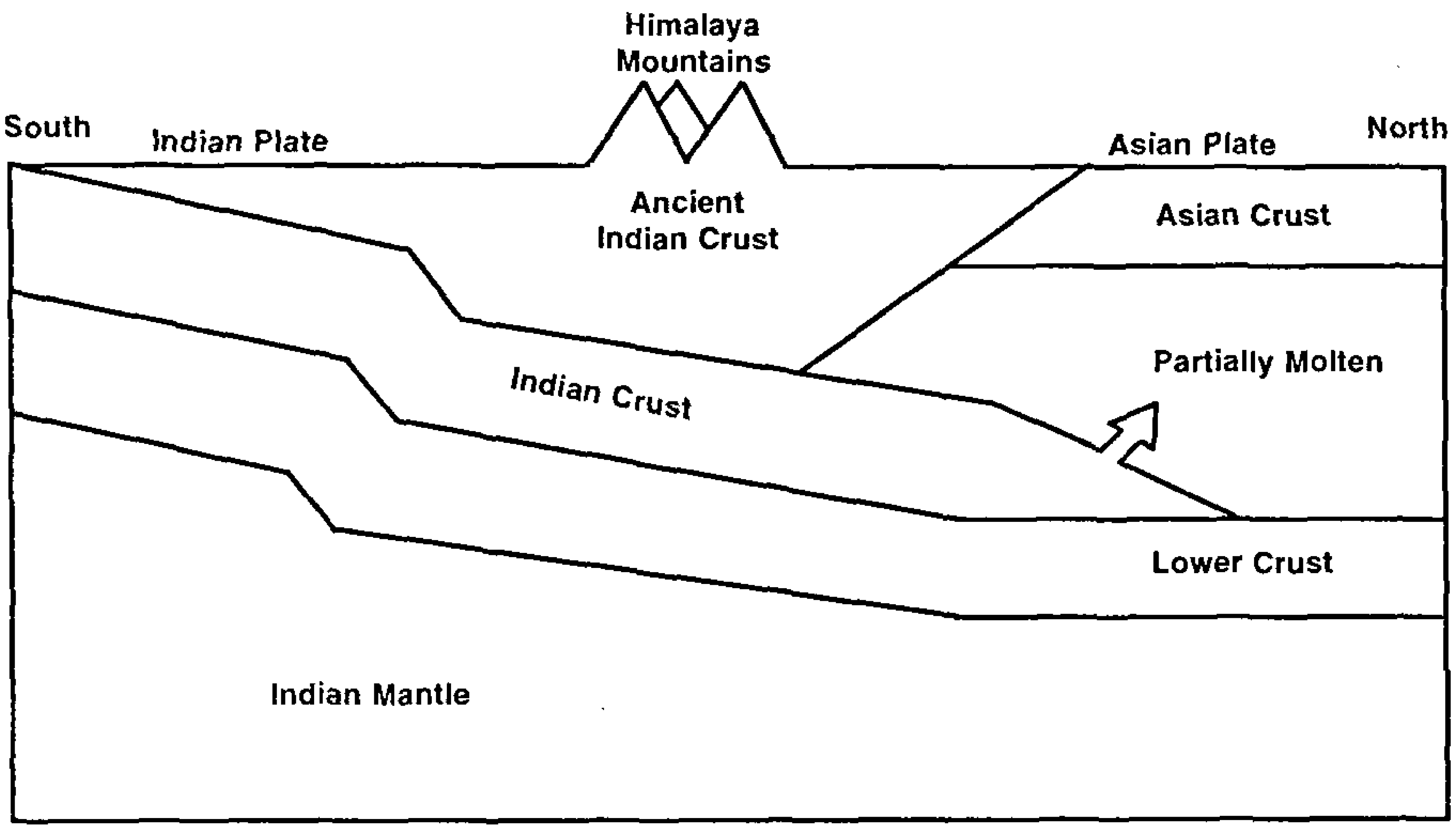

Figure 1. The India–Asia collision showing underthrusting and melting of the Indian crust and partial melt-zone under Tibet whose crust is twice the normal continental thickness.

knowledge of the orogenic evolution of the region. Called the 'INDEPTH' Project, this team of investigators spent the summers of 1992, 1994 and 1995 carrying out their surveys along the well-known Yadong-Gulu rift, the largest of several north-south rifts extending across the Himalayas and southern Tibet. They did seismic profiling using reflected waves from explosions set off in boreholes and also studied waves from distant earthquakes to calculate the density and temperature of the interior zones; in addition, they also conducted measurements of magnetic and electric fields to understand the electric properties of the rocks below, apart from carrying out routine surface geological survey.

The data gathered by the INDEPTH team[4–8] have further confirmed many of the observations by the earlier workers[2,9–14]. The combined studies by various teams over the years, have brought out some of the geological and tectonic aspects peculiar to this region. The highlights of their findings are (Figure 1): (i) The India–Asia collision has been in progress for about 40–50 m.y; (ii) A partially molten midcrustal material exists below 15 km depth which extends through a greater part of Tibet and petering out south of the Zangbo suture zone. (iii) The collision of these two continental plates resulted in the melting of the Indian and Asian crusts, obliterating their identity beneath Tibet. (iv) The Indian lithosphere extends as a mechanically continuous unit northwards, along with the upper mantle from northern India to the centre of Tibetan plateau. (v) In this process of underthrusting of Indian lithosphere into southern Tibet, its attached crust 'warms and partially melts, thereby contributing to a partially molten midcrustal layer[4]'. This melt zone is widely developed beneath the northern Yadong–Gulu rift and possibly much of southern Tibet[5,7], at depths of 15–18 km; however, the thickness and spread of the melt is not clearly demarcated[5] by the teams. (vi) Partial melting of the Tibetan crust induced by the crustal thickening is the most likely source of magma, which in composition may be granitic along with water[5,6]. (vii) The well-known Moho discontinuity, which demarcates the transition from the heterogeneous crust to the homogeneous mantle, is noticed along the entire length of the area surveyed at 70 to 80 km which is deeper than the customary depths for the continents. Existence of Moho at such uniform depth below Tibet implies that the crust/mantle boundary here is essentially flat[4]. (viii) The undulatory, discontinuous nature of the rift system studied (Yadong-Gulu rift) suggests that the magmas have invaded along the pre-existing structure or that the post-intrusion deformation continued for a long time. (ix) The high electrical conductivity of the middle crust in this region indicates that there is a regionally interconnected fluid phase in the crust[8]. (x) The regionally developed, weak midcrustal partial melt layer also explains why the Tibetan plateau is essentially flat.

The findings of the INDEPTH Project are indeed good breakthroughs in Tibetan Himalayan geology and one can hope that they will stimulate some revisions of the views about collisional orogens in other parts of the world; however, a serious lacuna about INDEPTH's present data relate to the fact that their studies covered only a small part of Tibet; the investigators appear to be aware of this as they are planning to extend their surveys over a wider area in the coming years.

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