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The Concept of Gondwanaland and Pangaea: A reappraisal

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***Abstract**: The Gondwanaland never existed as an independent continent, even for a day, as it is generally believed. There was a single mega continent on the Earth i.e. Pangaea that broke up as a consequence of the development of the mid oceanic ridges, late in Mesozoic, and certainly not before the Permian. The mid oceanic ridges are the consequences of expanding Earth. Plate tectonics depended entirely on subduction phenomenon for which there is no direct evidence and this concept is therefore largely untenable in the above context. The Indus-Tsangpo Suture Zone (ITSZ), believed to represent the northern boundary of Indian plate, but the relative ages as well as geological evolution of the Chaman-Onarch-Nal Fault areas donot justify the northward migration of Indian plate.In addition, there are evidences to support that the rivers flowing out of the Tibet area over the Indian plate must have existed before the upper Cretaceous i.e. before the Himalayas began to rise, which imply presence of a unified landmass comprising India-Tibet, and question the validity of Tethys. Also if the Indian plate has been constantly moving northward, the Himalayas could not be continuous with the mountain range either on the east or the west. In contrast to plate tectonics, the Expanding Earth concept convincingly explains the major tectonic features that include faults, rift valleys, geosynclines and mega shears. A sudden break in the appearance of these features on the face of the Earth as soon as Pangaea fragmented as a consequence of mid oceanic ridges is testimony to above contention.*
***Keywords**: Chaman Fault, Tibetan Glacial Deposits, Indus-Tsangpo Suture Zone, and Gondwanaland.*

I. Introduction

Although over half of the world's Gondwana geologists talked about the concept of independent Gondwanaland continent for more than a century or so, yet there are several doubts that need proper attention. Ahmad (1978) entirely on paleontological grounds suggested fairly uniform distribution of various genus and species of fossil plants, insects, invertebrates and vertebrates in all the continents. It would imply that the continents were not separated from each other until late Mesozoic i.e. there was instead only one landmass, Pangaea till Jurassic and may be later. By this time the Plate tectonics concept suddenly gained momentum and immense popularity all over the world in explaining major earth features. However, the Expanding Earth phenomenon raised several doubts in this regard, thoughboth the concepts unanimously agree the continental separation from Pangaea as a consequence of the Mid- Oceanic ridges and no drifting of continents is involved, anywhere and at any time. The Plate tectonic concept visualizes that the continental plates along one side of these ridges were being subducted to the similar amount that the ridges were extended as a consequence of magmatic intrusion and as a result the Earth's diameter remains constant. As against to this the Expanding Earth concept does not subscribe to the Subduction, and hence believes that Earth is expanding constantly (Carey, 1988).

The mega geomorphic features of Earth's surface including intercontinental lineaments (Narmada-Son in central India), rift valleys (eastern India and Antarctica), sutures (Indus- Tsangpo Suture Zone) and mega shears have attracted geo-scientific attention in early nineteenth century. Attempts are made to explain the genesis of these mega features of Earth's surface and their role in not only the shaping and evolution of continents and ocean basins through space and time, but also the formation of major sedimentary basins which later became the cites for hydrocarbon accumulations. Undoubtedly, the rifting and drifting of continental masses (Continental Drift Theory) and Plate Tectonic concept represent two major revolutions in analyzing Earth's geological past. However, there are yet several ground geological features which need suitable explanation as for as geological evolution of Indian sub-continent is concerned in light of these concepts. Among others, the important aspect of Indian geology is the concept of Gondwanaland, the term introduced by Edward Suess (1885) to accommodate southern hemisphere landmasses known for Gondwana affinity fauna, flora and rock record. It is shown as a unified landmass occupying southern hemisphere in popular reconstruction of Smith and Hallam (1970) and those of several subsequent workers. However, the independent identity of the unified Gondwanaland through geological ages has not been verified so far considering ground geological features.

The goal of this study is to reinvestigate and compare the Plate Tectonic and Expanding Earth, the two fundamental concepts of geology, with reference to the presence of Indus -Tsangpo Suture Zone (ITSZ), which represents the northernmost limit of Indian Plate. A critical analysis of geological features of Chaman and Onarch-Nal Faults may give insight into the so called northward moving India plate. The present study also raised doubts on the concept of unified Gondwanaland in view of several paleontological and other geological evidences.

II. Plate Tectonic Verses Expanding Earth Concept

The Greater India concept demonstrates a unified plate containing India and Tibet and the Indian sub-continent separated and migrated to the southern hemisphere, in the region of Madagascar, about 30^o – 35^o S latitude; the journey dates back to the upper Paleozoic. Its return journey began in the Late Jurassic/ Early Cretaceous and it finally collided with Tibet in Eocene-Oligocene, in the exact original location (Figure 1).

Figure1. Greater India migrated from the southern hemisphere and collided with the Angara Plate 20 Ma. The suture line should, therefore, exist and be visible all along from Arabian Sea to Bay of Bengal

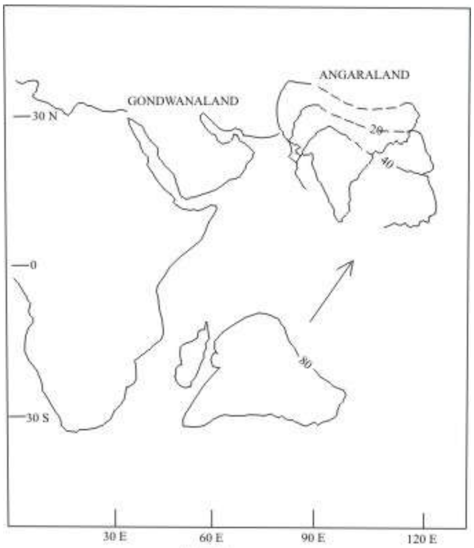


Figure 1

The Indian sub-continent remained part and parcel with Pangaea from Late Paleozoic to Late Jurassic; the duration records the deposition of Gondwana facies. However, no mid oceanic ridge exists in the area and how these down and up movements occur is not clear. On the other hand, it involves three sides of the Indian plate: (i) western, where it is supposed to have moved along the Chaman Fault for thousands of kilometers. This margin ought to have cut the coast which it fails to do. It is accordingly believed that the plate was originally moving along the Onarch-Nal fault, and then jumped over the Chaman fault some 50 km to the west. The Onarch- Nal Fault does indeed cross the coastal area (Figure 2) but it takes a sharp turn westward like almost every other fault in Baluchistan, while still on the shelf. (ii)The Indus- Tsangpo Suture Zone filled with ophiolites and (iii) the junction of the two plates in the eastern area. It should exist along the Assam-Bangladesh on the west and Myanmar (Burma) on the east. However, there is no feature in the area to support the concept of the plate Tectonics, looking for a place in Myanmar has placed it along the Arakan -Yomas. This is almost all along with Myanmar and not all along where it ought to have.

Figure2. NE-SW faulting in Baluchistan is extensive, but all the faults take a sharp turn to the west. Note Chaman Fault (CF) and even Onarch-Nal Fault (ON) do not cut across the coast and therefore no displacement of the blocks along the coast. (After Quittmeyer and Jacob, 1979) KR= Karachi, K=Kirthar Range.

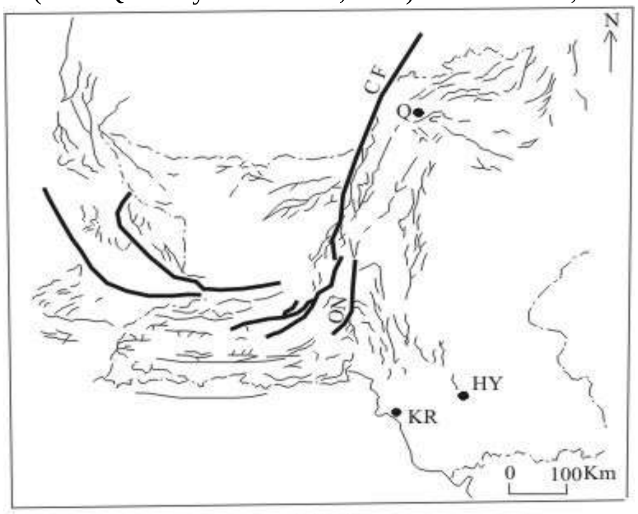


Figure 2

It is widely believed in plate tectonics that the Indian Block migrated along the left lateral Chaman fault. However, the following features of Chaman fault deserve proper attention in this context.

1. Auden (1974) visualized displacement along this fault is about 300 km in Afghanistan whereas; Lawrence and Yeats (1979) and Lawrence et al., (1992) have examined the geology on the two sides of the fault and concluded that the amount of movement in the Nushki area is about 200 km. Further south the fault has atleast nine breaks within nine km length (Figure 3) and unequivocally support that the fault is progressively younger in the south. The Chaman fault should have been younger in the north otherwise and therefore rule out the presence of suture. Moreover, the fault splays repeatedly in the westward trending branches in the southern part, of these, the Usman Fault being quite important. Had it been the suture, the splaying was impossible. The Chaman fault finally terminates near Shirazes in another splay to the west. These features do not support the migration of India along the Chaman fault. And, had the Chaman Fault really a suture, it would have been involved in a transcurrent movement of 1300km (Crawford,1979, p.107) and not a mere 200km or 300km.

Figure3. Chaman Fault shows several breaks in the Nushki area. Also it splays in west-ward branches. (After Lawrence and Yeats, 1979)

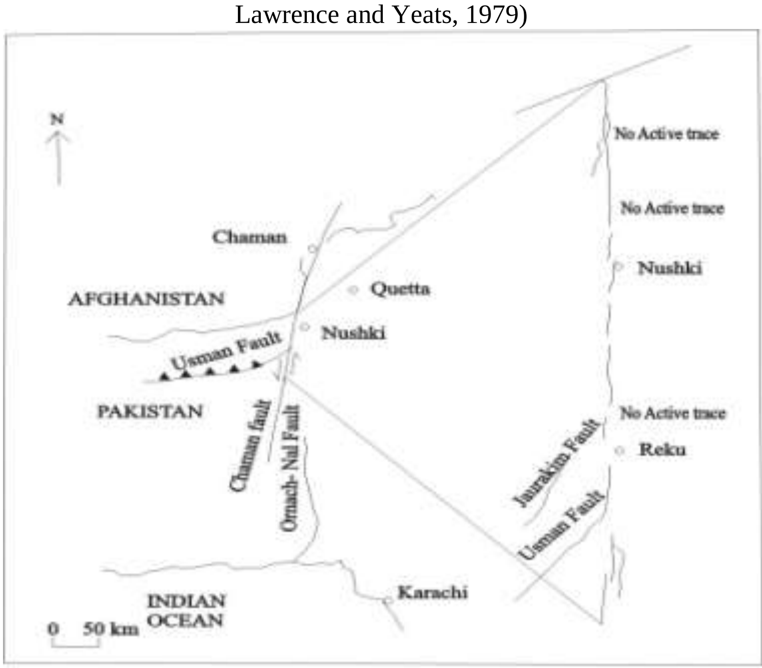


Figure 3

2. According to the Plate Tectonic concept the Indian plate moved earlier along the Ornach-Nal Fault but later jumped over to the new site to the Chaman fault in the west .There is no continuity between the two faults, and the suggestion therefore seems to be illogical. The Ornach-Nal Fault was selected because it was the only fault that seemed to cross the coast, but it does not, and takes a turn on the shelf itself. The Ornach-Nal Fault is still active as evidenced by an earthquake over the beach area of this fault in 1943. It clearly demonstrates that the feature does not extend into the oceanic area and therefore has no role for the northward migration of the Indian plate. Quittmeyer et al., (1979) and Kazmi and Jan (1997) have drawn attention to the westwardbend in faults of Baluchistan; obviously no fault in Baluchistan crosses the coastal area, a significant factor of utmost importance.

3. Powell (1979) has suggested that India moved along the Owen Fracture Zone in the Arabian Sea area. However, the Owen fracture is dextral as is evidenced by its displacement of the Mid-Indian Ocean Ridge near the mouth of the Gulf of Aden (Owen, 1981, figure 5). Moreover, the Owen Fracture Zone, too, stops short of the shore, and is superimposed by the northwest-southeast Murray Ridge, which reaches almost to the coast, east of Karachi. The Owen fracture zone therefore has no relation with the northward movement of Indian plate; though the sub-continent should have moved southward along it.

4. Northward, the Chaman fault reaches close to dextral Heart Fault, north of Kabul and extends beyond up to the Pamir knot (Sengor, 1990). The Heart Fault, apparently runs northeast to the south of Pamir, but does not join the Indus Tsangpo Suture Zone (ITSZ) which ends to the east of Nanga Parbat- Haramosh massif (Sarwar and DeJong, 1979, figure 1), apparently far away from the Chaman fault suggesting a clear gap between the two (Figure 4).

Figure4. Major tectonic trends in the Pamir-Himalayan region. Note that Chaman Fault joins Heart Fault north of Kabul, whereas, Indus-Tsangpo Suture ends east of Nanga Parbat massif well away from the Chaman Fault.

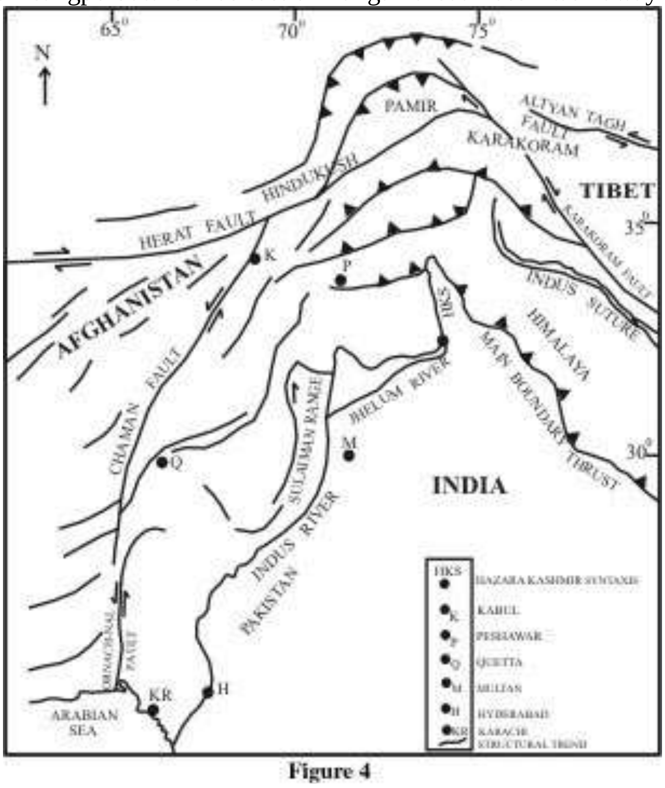


Figure 4

5. Chaman Fault is an active fault, and has, in the past been responsible for strong earthquakes and received considerable attention in recent years (Lawrence and Yeats, 1979; Lawrence et al., 1992; Kazmi and Jan, 1997). In Baluchistan, however, it does not reachthe coast, as believed in the past and comes to an end near RasKoh(Lawrence and Yeats, 1979, p. 351), but is ***en-enchelon*** with the Ornach-Nal Fault, which continues further south and does ***not*** reach the coast or on the continental shelf, takes a sharp turn to the west. Had these faults been the suture zone, with a long travelled block on one side and the Iran-Afghanistan block on the other, it could not but have been reaching up to continental slope.

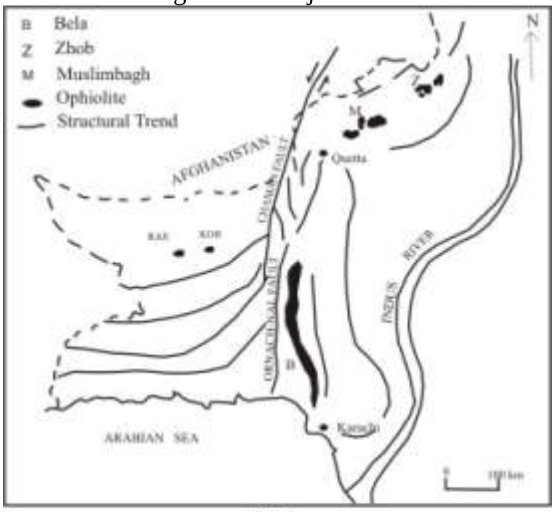
6. All the Baluchistan faults take a sharp turn to the west (see Kazmi, 1979, figure 1; Jacob and Quittmeyer, 1979, figure 3). This indicates counterclockwise oroclinal rotation (Carey, 1958), with compression developing within the subtended angle, and tension outside. However, Powell (1979, p.5) stated that "a similar

geometry could have been produced without substantial rotation". Yet, subsequently in the same paper he envisages several stages of counter-clockwise rotation of India.

7. If the Chaman-Ornach-Nal Fault is not the junction of the two plates, and there is no other feature that could be recognized as the suture between the two blocks.Thus, the Afghanistan, western Baluchistan was never separated from the Indian landmass.

8. Ophiolites are invariably believed to mark the zone of subduction. On the contrary, ***all*** extrusions of ophiolites in Chaman-Ornach-Nal Fault region took place well away from the fault and lie entirely on the two opposite plates (Figure 5).If they represent the oceanic crust obducted on the continental crust,the occurrences should confine to the fault zone. Their occurrence on the Indian Plate bespeaks of intrusion ***not***obduction, and they are invariably Cretaceous in age. This would mean intrusion or obduction preceded collision by a few hundred million years. Stoneley (1974, p. 899) admit that 'the ophiolites were emplaced while the Indian continent was presumably still some hundreds of kilometers away from Eurasia'. Tapponnier et al, (1981, p. 410) are worried that the emplacement of the ophiolites 'occurred earlier than at the end of the Eocene, ***which would place new constraints on speculations based on plate tectonicreconstruction'.***

Figure5. The ophiolites resulted from the collision along the Chaman Fault, however, lie well to the east of the fault, with no trace of its former existence along the line of junction.



III. The Indus-Tsangpo Suture Zone

The Indus-Tsangpo Suture Zone (ITSZ), an important type suture in the world, is believed to have been formed by the collision of the Indian plate with the Tibetan plate in the Eocene-Oligocene (Sinha, 2002;Jain et al., 2012; Valdiya, 2015). Paleomagnetic data indicated the under- thrusting of Indian plate below Tibetan block at the rate of 20-30 mm/ year (Armijo et al., 1984; Priestley, et al., 2008) or 50-55 mm/ year (Klootwijk, 1987;Thakur, 1993), and it is supposed to account for the double thickness in the Tibetan area. The evidence that emerges is discussed here.

1. The Indus-Tsangpo Suture ends abruptly near Rinbunsouthwest of Lhasa and north of Myanmar(Figure 6),with inJurassic slates, intruded by 40 Maold granites (Beloussov, 1979). Indeed, there is no trace of the suture east of this point which raises the question: If, as envisaged by plate tectonics, there was an ocean between the Indian and Tibetan plates, and the Indus-Tsangpo Suture marks the zone of subduction, collision and obduction, in front of the northward moving Indian plate, where is the subduction zone in front of the Assam area? It, too, must have moved northward almost as much as the rest of India. It means that a length of over 800 km. and an oceanic area of 2.5 million km. are involved. Where did it disappear?

Figure6: Indus-Tsangpo Suture is noted for its ophiolites and Triassic mélange and ends abruptly at Rinbun, southwest of Lhasa, against Jurassic slates.

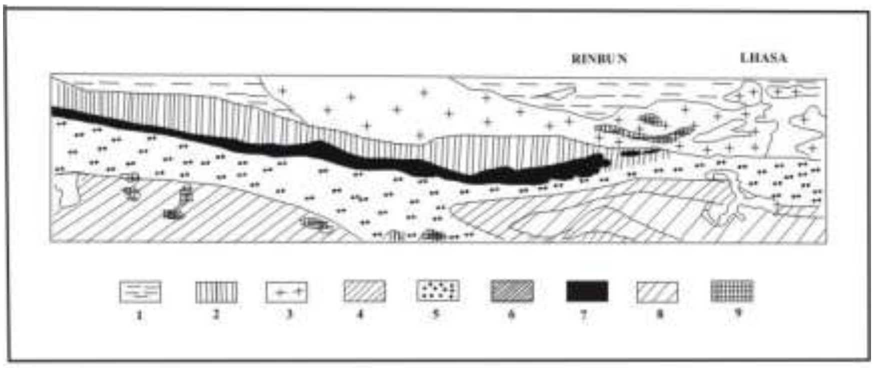


Figure 6

1-Linqzizong Formation; 2-Xigaze Group; 3-Triassic Flysch; 4-Jurassic sediments; 5-Gangdise Belt; 6-Himalayan Granites; 7-Ophiolites; 8-Cretaceous sediments; 9-Lhasa Granites.

2. The two ophiolites occurring in the suture zone are dated as Late Jurassic-Early Cretaceous, and Early Cretaceous, respectively (BaoPeishing and Wang Xibin, 1984) implying the arrival of ophiolites at the site about 100 Ma before the collision. The ophiolites therefore could not be the consequence of collision- 100 Ma is a lot of time. Also, important in this context that these ophiolites in the Indo-Tibetan region are not only confined to within the two plates, but are discontinuous, with several small intervening breaks. Significantly, while the ophiolite emplacement was taking place in the Indus-Tsangpo rift, intermediate-acid volcanic were erupted extensively over the Lhasa block, to form a vast batholiths. Magma movement was, obviously, on a massive scale and suggesting the Indo-Tibetan region was in state of tension.

3. The two ophiolites under reference are not only of two different ages but they have originated from two different depths, and hence are of different chemical and physical characters (BaoPeishing and Wang Xibin, 1984). These dissimilarities rule out the presence of oceanic crust, otherwise they would have been identical.

4. The oceanic magma emplacement occurs at normal temperature but the ophiolites in a liquid stage have resulted in contact metamorphism on both the faces of the plates of the so called suture with scores of pillows and penetrating dykes and sills. LainRixuan and BaiWanji (1984), and O'Brian, et al., (2001) pointed out that the northern ophiolites originated at a temperature of 1105-1240^{o}C and pressure of 24-46 kilo bar indicating that it has come up from a depth of 80-140km. Xenoliths of country rocks are common and confirm that the magma was in a highly fluid state. This would suggest that there were several intrusions, allowing the earlier one to cool down and solidify. However, these evidences cannot fit in with the obducted ocean floor scenario, advocated under plate tectonic concept. In addition, the ophiolites emplacements are confined within the two walls of the Indus-Tsangpo Suture, but the two walls slope at an angle of 60^{o} to the north and south (Tapponnier et al., 1981, p. 408) suggestive of a rift valley and not a suture zone. More significantly, they are discontinuous, with several smallintervening breaks. XiongShaobi et al., (1984) have concluded from their geophysical studies that the area to the north of the Indus-Tsangpo Suture Zone has risen whereas that to the south has subsided, and the activity produced a deep trench in between strengthen the above inference. Underthrusting of the Indian plate beneath the Tibetan plate isthereforeruled out.

5. The Indian plate is believed to be progressively under thrusting the Tibetan plate (Turcotte, 1984, Acharyya, 1992, Zhao and Nelson 1993 and Priestley et al., 2008). This is supposed to account for the double thickness of crust in the Tibetan area. However, the contact metamorphosed face of the Indian plate which is believed to be underthrusting the Tibetan plate every day remains where it was. If so, it would have been disappeared underneath the Tibetan plate? It would be relevant to point out here that low shear wave velocity and high Poisson's ratio has been detected in northern Tibet by Owens and Zandt (1997), which reveal that there could not be cool Indian crust underthrust beneath there (see also: McNamara et al., 1994). Therefore, the underthrusting of Indian plate cannot convincingly interpret the doubling of the Tibetan crust.

6. Plate tectonic concept advocates that the Indian plate has been underthrusting Lhasa plate since the collision in Eocene-Miocene and suggested that the latter has been uplifted as consequence. However, the Tibetan plateau in the latest Pliocene had a subtropical climate and was about 1000 m in altitude.The uplift to 4000 m or more took place beginning in the Pleistocene (Han Tonglin, 1984, p. 75)and genetically related to the widespread normal faulting over the Tibetan plateau. The continuity of these faults from the Tibetan plate upto the Indian plate, south of the suture bespeaks that no underthrusting is in progress.

7. Paleomagnetic evidence insists that Greater India has migrated from southern hemisphere position to suture with the northern continent and underthrust the Lhasa block to about 2000 km Klootwijk (1987). To underthrust the Tibetan plate, the Indian plate would have to cut ***across*** some 8-20 km thick ophiolite wall – an impossible preposition.Moreover, if the Indian plate has underthrust the Tibetan plate to about 1000 km plus

500 km of shortening believed to have taken place along the Himalayas (Gansser,1993), there should be a displacement of this order along the western margin of the Indian plate i.e. along the Baluchistan coast, yetit is just not there. The Baluchistan coast is smooth and continuous from Sind to Iran, not only physically but also geologically, with no displacement along the supposed junction. Neither the Chaman Fault nor any of its parallel faults being so recent that they have not produced a major dislocation of the coastal line like the Baja California (see Ahmad, 1978).Similarly, the paleomagnetic evidenceon whichthe entire plate tectonicconcept depend is based upon the paleomagnetism of the Indian rocks. However, at the envisaged moment Greater India was adjacent to Australia along the eastern coast(till about the Eocene) and couldnot have moved without moving the latter.Yet no supporting evidence from Australia seemsto have been reported,nor from Africa and Antarctica that, too was continuous with the Indian continent.

8.At the time of the collision the two blocks are supposed to have got stuck together. However, the required force that separated the two blocks by about 8-20 km, especially when the Indian plate was moving northward needs suitable explanation? This feature clearly favors the presence of a rift valley and not a suture. The contention supports the conclusion of Stocklin (1981) and Kumar (1990) that a rift opened in the area in Triassic and continued to deepen till magmatic intrusions took place in the Jurassic-Cretaceous and threw up the accumulated sediments as mélange.

9. The presence of minerals like diamonds, enstanite, poissanite and REE etc. in the ophiolites evidently confirms their origin at considerable depth (Liang Rixuan et al., 1984; and O'Brian, et al., 2001). Lain Rixuan and BaiWanji(1984) pointed out that pisolitic structure in the chromites ore is indicative of a molten state and separation from a melt. Crystal settling is well developed in the ophiolites and verticalzoning is clearly recognized (Cui Junwen, 1981) with the upper acidic and the lower highly basic layer, including cumulate gabbros and peridotites near the bottom of every exposure. The sequence is often underlain by harzburgitetectonites, with frequent veins of rodingites. In addition, dyke complex has been recognized.These featuresnot likely to exist in obducted oceanic crust occurring in the suture zones. Also, important is the fact that the Xigaze ophiolites are, in their chemical composition, different from those of the northern belt, and are very similar to mid-oceanic ridge tholeiites (Xiao Xuchang, 1980, p. 160; Yang Ringing, 1984, p.123).

10. The under-thrusting of a 30-35 km thick plate beneath the other plate of similar thickness is seems to be unlikely, because there is no reason why the Indian plate dips below the Tibetan plate up to such a great depth. The Indian plate is believed to have been moved from area close to Madagascar before it collided with the Tibetan plate i.e. when it arrived at its original location. Thereafter it is believed to have underthrust the Tibetan plate for 500 km (Turcotte, 1984, p.11). The western boundary of the Indian plate cuts across the Baluchistan coast almost at right angle and if there has been the under-thrusting, there should have been a displacement of the Indian plate by 500 km towards the north. However, the Baluchistan coast is perfectly smooth with no evidence of any excessive movement of the Indian plate.

11. There are three other suture zones namely Bongong-Nujiang, Jinshajing-Tungbianheand Jinsha-Tongbian in the northern Tibet (Figure 7). They become progressively older northwards, and the same tendency is continued in six sutures north of Tibet. It is therefore believed that the Indian plate separated repeatedly from the northern landmass and then returned to amalgamate with it. The oldest suture is known as Keramait in northern China, being of middle Devonian age (FengYimin, 1984). Indeed, the amount and intensity of such force which is to be capable of pulling and then pushing the plates back is not known. It seems more likely that repetitive intrusive force of magma tried to break through the crust , but because of the immense thickness of the crust it could not succeeded thoroughly, instead the magma shifted southward again and again. Segnor et al. (1988) has reported 140 suture zones in central Asia but there is ***not*** a centimeter of ophiolites in any of them. Rift valleys bounded by high angle faults were perhaps caused by Earth Expansion, as pointed out elsewhere. Apparently there is no other force seems to exist that could result these fractures in many hundreds and thousands of localities, round the earth. However, the southward migration of these suture zones progressively from the north Chinese-Tibetan rift has not been explained as yet. Ahmad and Ahmad (1980) have drawn attention to a similar situation in the Indian sub-continent where the younging is counter-clockwise. Thus, this younging continued till the magma reached the Himalayan area, where the crustal thickness is of the order of only about 50 km, broken through the crust easily and the area was uplifted.

Figure7. Tibetan ophiolites belts become younger southward and are followed by the Himalayan Range.
1=Indus-Tsangpo Suture; 2=Bongong-Nujiang Suture; 3=Jinshajing-Tungbianhe Suture; 4= Jinsha-Tongbian Suture

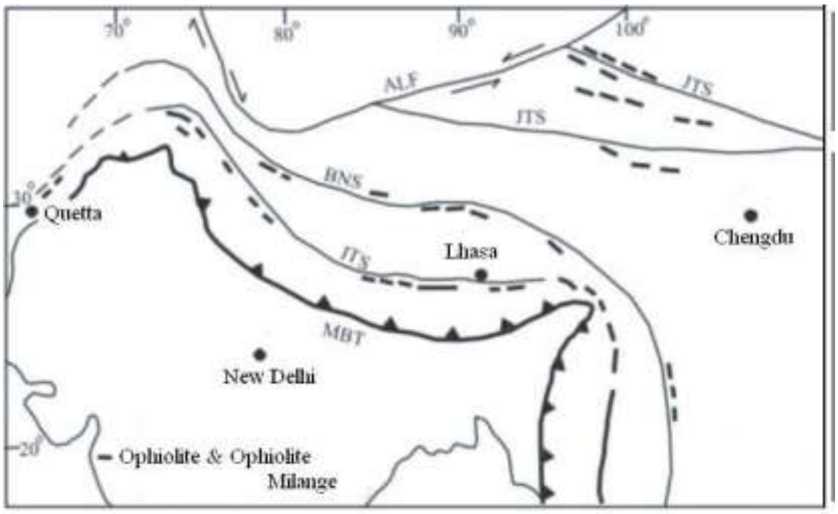


Figure 7

12. The important evidence in this context is the occurrence of the glacial deposits of northern Tibet covering a larger area right up to Kunlun mountain Range (Sinha, 2002; Shenglong et al., 2015). It is overlain by Permo-Carboniferous beds up to 1600 m thick everywherewith occasional striated erratic up to 5-7 m in diameter. The entire debris has been transported from the south i.e., India (Dewey et al., 1988; Casshyap et al., 1993) because the South Pole was located in India, and the North Pole was near Verkhoyansk (Ahmad, 1988). This fluvio-glacial deposit carries fauna and flora of typical *Gondwana* affinities, including ***Stepanoviella,Eurydesma,Noeggerathiopsis,*** and other forms typical of Glossopteris flora (Wang Naiwen, 1984; Waterhouse, 1992; Upadhyay et al., 1999). These glacial deposits were reported by Norin(1946) followed by (Bally et al., 1980) and were assigned that of Gondwana origin of the Lhasa Block. However, (Tapponnier et. al., 1981) has amazingly pointed out that 'north and west of Lhinzu, the Precambrian metamorphic basement is probably covered by Carboniferous tillite and diamictite with Gondwana affinities' and concluded that 'the Lhasa block is a fragment of Gondwana'(see also: Zhongbao Zhao, 2015). Accordingly, that this was 'a serious constraint to plate tectonic interpretation'. Later on Tapponnier et al. (1981) reinterpreted the entire glacial deposit as 'rift infill' ignoring the very existence of Gondwana flora and fauna. In view of the wide spread occurrence of these glacial deposits the suggestion of a narrow rift infill is not convincing.

13. In addition to late Paleozoic basal Gondwana tilloids, the disposition of coal,evaporate and carbonate sediments also reveals an equatorial symmetry during the Paleozoic and Mesozoic (see: Meyerhof et al., 2012) which is best explained if the past positions of the continents are assumed to be the same as they are today.

14. Of equal significance is the lower Permian vertebrate fauna of Kashmir valley including ***Archaegosaurus, Actinod*ont, *Lapsitergium*** and others forms similar to European vertebrate. Further, it is important that the Triassic fauna with ***Lystrosaurus, Proterosuchians,Metaposaurus, Phytosaurus*** (Romer, 1973) exposed simultaneously in India, East Africa, and South Africa with *Lystrosaurus* having been reported from Europe and Antarctica as well. Segnor et al., (1988) opined that 'the Gondwana affinities of the Lhasa Block and its close proximity to the glacial terrains are beyond dispute'. With India thousands of kilometers away in southern hemisphere these similarities in fauna cannot be explained by plate tectonic concept. On the contrary there is a possibility that India and China were obviously together even after the Gondwana period and no oceanic gulf or paleotethys separated these two in the Carboniferous (Smith, 1988) and its continuation into the Jurassic-Cretaceous.Morerecently, it is pointed out that ***AmphilagusTomidai*** is a genus that lived on the Earth about 15 Ma ago, was traditionally thought to exist only in Europe, but remains of this mammal were recently located in Asia (Angelone, C., Catalan Institute of Paleontology Spain, Times of India, 28th Jan 2016, p.17). "This indicates that there were some paleogeographic and environmental conditions that favored the expansion of this species toward the east" and gave rise to the natural barrier free linking of Europe and Asia due to the disappearance of Paleotethys Sea which could have allowed for the spread of these mammals when was the India in the southern hemisphere then?

14. The continuity of the geological formations across the suture zone leaves support that neither the Indus -Tsangpo Suture Zone (ITSZ) nor the Bongong- Nujiang and even the Jinsha-Tongbian Suture Zones were ever separated northern continent from India especially not so during the period the landmasses are supposed to have been separated, presuming India in the southern hemisphere.

15. Geophysical studies over Tibetan plateau Cui Zuoxhou, (1984) and Zhang et al., (2002) pointed out that although the crust in the plateau is 70 km thick there is 'no evidence of twin crustal structure' which should

have been if the Indian Plate is under-thrusting it for millions of years. Further there is no explanation as to why the thickness of the crust is, as mentioned earlier, very similar immediately to the south of the Indus-Tsangpo Suture Zone, and only thereafter it decreases progressively, the nearer to the Himalaya and onto the south of the range.

16. The deep seismic sounding (DSS) between Pamir and Kashmir (Beloussov, 1980; Kaila and HariNarian, 1981) proves that there is neither suture at Indus-Tsangpo area nor any subduction of the Indian plate below the Tibetan plate. Qureshy and Warsi (1981, p. 221) state that' a number of geologic factors seem to cast doubt on the existence of subduction zone along the Indus-Tsangpo Suture (ITS) so did the satellite and terrestrial gravity data'.

17. The northern (Tibetan) and the southern (Indian) blocks are separated by 8-20 km thick ophiolites, considered in plate tectonic concept to have been formed at the time of collision. Moreover, it is not possible for the under-thrusting Indian Plate to have cut across this thick ophiolites wall to get underneath the Tibetan Plate, ruling out the progressive under-thrusting. On the contrary, the age of the emplacement of the two ophiolites is undoubtedly upper Jurassic to lower Cretaceous and lowest Cretaceous i.e. 100 Ma before the age of collision. If the ophiolites are older than the collision, they could not have separated the two plates, and no other force is known to pull them apart by 8-20 km. On the other hand, where did the ophiolites rest for the 100 Ma, if they had penetrated the rocks that now are described as the so called Tibetan and the Indian Plates?

18. If the ophiolites erupted when the Indian Plate was in the southern part, how it crystallized in the process of solidification, with crystals sinking low, and how the margin of the Indian Plateis contactmetamorphosed, as mentioned earlier. Also how did it get chilled itself? If it was not intrusive, it would have solidifies like basalt.

19. According to Plate tectonics, volcanism of island arcs resulted from partial melting of the down going slabs of oceanic lithosphere, yet in the case of Indus-Tsangpo Suture (ITS), down which has gone thousands of Km. of oceanic crust, no partial melting have taken place, and consequently no volcanoes exist in the Tibet area. There were a few dormantvolcanoes associatedwith the riftvalleys. Incidentally, their association with the rift valleys in Tibet as in Africa suggests that they are a tensional feature. And Briden (1976, p. 415) admitting that 'geological evidence of subduction is self-destructive on plate tectonic reasoning'.

20.The continents can move along the Mid-Oceanic Ridge or along mega shear. In the former case the intrusions on the two sides of the ridge, are frequent, but the continents cannot normally separated or move away from the ridge, whereas the mega shear can move it along for long distances. The intrusion on the two sides of the Mid-Oceanic ridge is frequent and shall, presumably, go on forever. The plates on the two sides remained joined to the ridge by frequent intrusions. Then how could the plates give up the Mid-Oceanic ridge and return to its original site?

21.If the Indian Plate migrated to the south as a consequence of the appearance of Mid-Oceanic ridge, it must have appeared somewhere close to the existing suture zone. It ought to have moved the Tibetan Plate northward by about the same distance. Then another Mid-Oceanic ridge must have appeared south of Madagascar and moved the Antarctica/South Africa southward and India northward. But where and how did the earlier Tibetan Mid-Oceanic ridge disappear, and where was the second ridge; the Mid-Oceanic ridge cannot disappear silently.

IV. Gondwanaland

Edward Suess (1885) originally introduced the term Gondwanaland to include all those continents where Gondwana affinity rocks and flora are known to occur. Wegener (1926) adopted the word Gondwanaland while proposing the concept of drifting continents, although never considered it as a unified independent continent. Consequently, it is not depicted as independent landmass in either of his diagrams, the feature of utmost significance. Indeed DuToit (1937) has given a concrete shape to this super continent ignoring the vast Tibetan glacial deposit or those small exposures of Iran, Afghanistan, Turkey and Saudi Arabia? DuToit's map of the Gondwana glaciations covers almost the entire continent, although considering the then position in Europe there was apparently no fall in temperature over the globe; the fact that perhaps it was little warmer than normal; theGondwana ice-cap of DuToit was almost four times the present day Antarctica ice-cap. Ahmad (1960) considering the minor differences in the age of the ice-caps in the different continents and concluded that the pole moved over these continents, and so did the ice caps. There was, thus, continuity in glaciations and the ice-caps were never very large at any time as suggested (Du Toit, 1937).

The paleontological evidences are given due attention in age determination as well as the correlation of stratigraphic units, besides some constraints in the correct identification of the fossil forms. Ahmad (1978, 1982) reported a gross similarity of fauna and flora in all the Gondwana continents till Cretaceous, though the little differences in fossil forms may be due to climatic variations. The faunal evidence therefore clearly indicated that till the Cretaceous times there was only one continent i.e. Pangaea. The movement of vertebrates is more difficult than those of marine and non-marine invertebrate's forms. However, as pointed out earlier the lower

Permian vertebrate fauna of Kashmir was identical with that Europe.It would not mean that during this period the climate was uniform all along and there was neither the presence of large river or intervening marine gulf nor any mountain or large desert area to obstruct food supply of the than habitants. Indeed it was readily available, and there were no enemies inhabiting the area. These are, by no means, easy requirements and are applicable wherever vertebrate or invertebrate life forms are involved. It has been pointed out that the Triassic vertebrate fauna of China is identical with the India, East Africa, South Africa and Antarctica, while ***Lystrosaurus*** also existed in Europe and Thailand.Chatterjee and Scotose (1999) and Prasad and Manhas (2007) pointed out that the Jurassic mammals from the Kota Formation in India have a worldwide distribution. Similarly Jurassic vertebrate fauna of China andMongolia is common with that ofAfrica and Europe put an end to all reconstructions which involved oceanic Tethys. Further, the occurrence of several taxa's belonging to ***Triconodont*** and ***Symmetrodont***mammals of upper Cretaceous of India showing remarkable affinity with the contemporary forms of China, Mongolia, Central Asia, Siberia and Europeprovides impelling evidence that there were overland communications between India and other continents. These communications are not reconcilable if peninsular Gondwanic unit in Tethys isolated from the other.

The above mentioned paleontological evidences support that there was only one continent Pangaea till at least the Triassic, and hence ruling out an independent identity of Gondwanaland. Sdzuy (1969, p.6) suggested that 'Asiatic Tethys splinted up into a system of seas separated by land'; an attempt to put forward the concept of an epicontinental / oceanic Tethys. Ahmad's (1981) paleogeographic maps of the Eurasian region during Carboniferous, Permian, and Triassic and Jurassic periods indicated that the Tethys was not oceanic in character. All sediments belonging to these ages from China are non-marine and did not originate in oceanic area. Interestingly, the area remained unaffected by any orogenic activity since Cambrian. Seismic and magneto-telluric studies suggests that it was a double thickness area (over 60 km of crustal thickness), perhaps due to under-thrusting of Indian sub-continent below Angaraland (Zhao and Nelson, 1993; Gokarn et al., 2002). An uninterrupted rock record of sedimentation from the Ordovician (may be Cambrian) to, perhaps, Cretaceous, over the entire Central Asian region evidently justifiessuch exceptionally thick deposit and rule out the above concept of under-thrusting.

Ahmad (1982, p.161) has pointed out that 'It is evident that there is no case of an oceanic Tethys and the so-called Gondwanaland was obviously continuous with Siberia on one side, and America on the other providing free migration for forms of life (including marine vertebrates – even pelagic and benthonic habitant – as also fresh water forms, insects and vertebrates). In this context, the assembly of Pangaea bear no place for a wide oceanic wedge, as appeared on the often quoted Smith and Hallam (1970) reconstruction, and many other variants of the same; and if the 'gaping gore' made to disappear on an Earth of a smaller diameter, as Carey (1976) has demonstrated accepting Earth Expansion. Crawford (1974, p.379), too, believedthat Tethys was epicontinental and Smith (1971, p.2041) wondered that if ever it did exist it seems to have vanished from the region to the north of India.Beloussov(1979, p. 209) considered that it was an incursive sea. The imaginary barrier, an oceanic Tethys,that had been presumed between Gondwanaland and the northern continents should be given up – it simply did not exist in the Paleozoic or Mesozoic, and perhaps never thereafter. There is, thus, no evidence for a virtual shuttling of the continental blocks, as presumed in the so-called Wilson Cycle.

The Gondwanaland concept suggests that continents drifted away because of convention currents underneath. Many geoscientists do not agree with this concept (see: Raiverman, 2002), because the bottom of the Earth's crust is not smooth, underneath the mountains it is being deep rooted, and certainly obstruct the slipping of plates. Moreover, the supporters of plate tectonic and the Earth expanding concepts unanimously agree that the continents separated from their original positions in Pangaea by breaking apart due to the appearance of mid-oceanic ridges as also of the mega shears and tensions across the landmass. These features became wider progressively due to intrusions of igneous rocks. None of these concepts contribute to drift concept of Gondwanaland, and if the continents are separated as a consequence of any other processes, and not drifting, the question of continental collision does not arise. India's migration southward and even more so, its return journey to its exact original position, as discussed earlier, does not have an intervening route of any of the categories. Thus, the envisaged movement of the Indian landmass is untenable.

Chinese geologists came out strongly against Indus-Tsangpo fault representing a suture zone, but are puzzled where to place the junction of the two landmasses in terms of plate tectonics.Thus, Wang Naiwen (1980) stated that 'it is unbelievable that the Yarlung-Zangpo Indus belt is the suture between the North and the South continents' (see also Wang Naiwen, 1984). ZhengHaixiang (1984) also stated 'the Y-belt is not entitles to be the suture zone'. XiongShaobai et al., (1984) have concluded from their geophysical studies that of the two sides of the so-called suture' the northern side evidently rises and the southern side subsides and forms a deep trench', and both the sides, however, dip at a high angle towards the middle of the feature.If this identification of the feature with a rift valley is accepted, it follows that the Indo-Tibetan region was, then under tension. Lin Baoyu and QuiHongrong (1984) reiterated, based on the characteristics of the biota and sediments that both flanksof the Yarlung River belong to the same biographical terrain with common brachiopods and other cold water fauna. Owen (1976), based on sea floor spreading data, concluded that 'the evidence for a former Tethyan ocean between Gondwanaland and Laurasia does not exist. Waterhouse (1986) is more emphatic about the concept that the glacial fauna and flora on the two sides is identical and belong to the same ancient plate. Xiao Xuchang(1980, p. 167), too, insists that 'the Permo-carboniferous system occurring on both sides of Yarlu-Zhangbo River be regarded as forming part of a single platform domain'. Ahmad (1981) concluded from his paleogeographicstudy that the Tethys was an epicontinental sea and not an ***ocean*** covering the middle Pangaea from its eastern coastal region in China to its western coastal region in Central America connecting western Proto-Pacific to eastern Proto-Pacific.

It is quite interesting to investigate the ages of a number of the Himalayan Rivers such as Indus, Sutlej, Sarju, Ghaghara, and Tsangpo- Brahmaputra originating in Mount Kailas. These rivers cutting through the Himalaya trend, and they must have been well established when the Himalayas began rising, for only then such cross cutting relationship may develop. The major uplift of the Himalayas was undoubtedly in the Pleistocene-Quaternary times, but earlier eras of the uplift are recognized in the Oligocene-Miocene that postdate the supposed collision. It implies that there was no paleotethys in the region of the Himalayas or north of it and Pangaea must have been without a gulf, oceanic or freshwater. Tibet and India must have been together till at least the Eocene, when the collision is supposed to have taken place. Pandey (1992) and Saxsena and Gupta (1990) have suggested the beginning of Himalayan uplift in the Late Cretaceous. It was marginally uplifted, but was traversed by these rivers, flowing overland, as pointed above. This leads the conclusion that these rivers existed prior to the Late Cretaceous uplift. Contrary to this view, the followers of Plate Tectonics believe that India must have been far to the south, and could not have been subjected to uplift movement. This signifies that the rivers on the Tibetan Plate continued onto the Indian Plate for thousands of kilometers, and indicating the possibility of India being part of a landmass Pangaea all through.

On the other hand, plate tectonics asserts that the Himalayas originated as a consequence of the collision of the Tibetan and Indian Plates. However, these mountains continued to the east in Myanmar and China, and to the west right up to Italy. If the Himalaya has moved northward and still moving and the Indian Plate is progressively under-thrusting the Tibetan Plate, then and large discontinuities or gaps should have been developed between the ranges over the Indian Plate and those over Myanmar and China as also the range over the western region. The continuity in the two regions therefore raises doubts for the acceptance of a progressive northward movement of the Indian Plate under Plate Tectonic concept. An interesting feature is the development of faults (lineaments), rift valleys, geosynclines, and mega shears over the continents in large numbers which facilitated the movement of landmasses at large; for example a movement of 300 km has been discussed elsewhere. Faults could be even two or three meters long, geosynclines and rift valley could be thousands kilometer in length, whereas, mega shears could extend eight or more thousands kilometers in length (Carey, 1988). Some of these rift valleys continued to develop and tapped the magmatic level in the mantle and such areas were recognized as geosynclines. These, too, extended over thousands of kilometers originally with lateral sideward migration. In some cases geosynclines continued for millions of years and commonly have horizontal movement along them whereas the mega shears could naturally move a continent for thousands of kilometers. None of these, however, can bring back a landmass to its original position except to that has happened in the case of India. All these features are, however, the result of Earth expansion and they almost stopped appearing by the end of the Mesozoic. In the initial stage the Earth expansion must have produced tension on the surface but soon cracks started developing in the crust. To start with, the earlier cracks were small, but soon they became larger, till they were thousands of kilometers long, and recognized as mega shears and geosynclines depending upon their characters .However, it seems that the process of expansion became faster and Pangaea itself started breaking up, with mid-oceanic ridges appearing within the Pangaea landmass in a number of places. New geosynclines, faults and rift valleys stoppedappearing suddenly from the surface of Earth.

The oldest age recorded from the continental areas is of the order of 3.8 Ga, nowhere the oceans are older than 2.25 Ga, which incidentally corresponds to the envisaged final break-up of Pangaea. It may be explained by the subduction of the oceanic areas, it is amazing that nowhere has an older oceanic crust survived, or none has been discovered to date.

V. Conclusions

The above discussion leads to conclude that the Chaman fault is a transcurrent fault. It exhibits less movement in the south than in the north; there are nine breaks along it, and also repeated bifurcations in the southern area casting doubt on its origin and character. Obviously the fault was growing towards the south and terminated much before reaching the coast. Hence the suggestion that the Indian Plate is supposed to have jumped from the Ornach-Nal fault to the Chaman Fault is not justified.The occurrence of glacial deposits with Gondwana fossils provides positive evidence that India was part and parcel of Pangaea at least in the Carboniferous-Permian. Presence of similar vertebrate fauna demonstrates that it occupied the same position during Permian, Triassic and Jurassic being common to Laurasia and Gondwanaland. If so, the India must have occupied the same position earlier at least in Ordovician, and may be Cambrian.

Faults, rift valleys geosynclines, mega shears are all products of Earth expansion and they continued to developed throughout the Earth till the Earth Expansion became very rapid and the crust started breaking up by the appearance due to mid-oceanic ridges. No other explanation is seems to give suitable answer to such world-wide occurrence of cracks in the crust.

Himalayas began rising in the Late Cretaceous, and a number of rivers crossing it must have existed from an earlier period on the earth surface. This suggests that India and the Tibet have been together since at least the Late Cretaceous, and may be considerably earlier. The Himalayas continue to the east in Myanmar and in the west up to Italy. The northward moving Indian plate carrying the Himalayas should has formed gaps in the eastern and western parts of the Himalayas. The absence of these gaps may rule out northward migration of India. To sum up, the success of any scientific theory is not measured by being in fashion or by how many followers it garners but whether it can stand up to the test of time and the above study call for it.

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