

To begin with, the mountains directly bordering it have contributed but a small portion of the sediments spread before them. The Amu, for instance, brings most of its load from many hundred miles behind the border ranges, whereas these border ranges probably had the benefit of rising to give way for sinking of most of that load, if the differential movements of sinking plains of deposition and rising of worn-down mountains resulted from such a displacement. Another deviation from the ideal type is a serious difference in height of mountains from east, where they rise to over 20,000 feet, to west, where the Kopet Dagh attain a maximum of only 9,000 feet. And this difference appears to have been no less in Tertiary time, for no crystallines have yet risen to view in the Kopet Dagh, though the Pamir and Tian Shan have weathered to their granite cores. More sediments were, therefore, loaded onto the plains in the east, and we find that mountains there were uplifted higher and more often than the Kopet Dagh, where only one really great erosion cycle appears to have followed the peneplain stage, though the second and third uplifts are recorded on a small scale. Besides all this, the plains have been seriously warped, a fact evidenced by channels of the Oxus and Zerafshan and other streams, probably as a result of the great difference of deposition load over different areas.

Perhaps even more serious than these internal organic peculiarities must have been the climatic complications arising from external sea connections. A recent connection between the Caspian and Black Seas through the Manitch, north of the Caucasus, and a more remote overflow of an Aralo-Caspian Sea through Siberia to the Arctic, limit the possibility of climatic calculations based on determinations of sea-water areas. The moment an interior sea either overflows or receives an influx from some other basin or of tide-water, its surface area ceases to be a function of climate. And, on top of all this, the river Don, behaving in the uncertain manner of a large aggrading river, may have flowed alternately into the Caspian and Black Seas. It is, however, hoped that a more complete study of the past and present marine fauna and flora of the Aralo-Caspian Basin may decipher most of these remarkable hydrographic variations.

#### THE LACUSTRIAN ZONE (ARALO-CASPIAN SEA EXPANSIONS).

Its lacustrine or marine history, though involved, affects such a large area and throws so much light on its climate, especially during archeological time, that it becomes of first importance. Russian and other geologists have naturally directed special attention to this aspect of the basin, but their work has so far been lacking in quantitative results. After the early Tertiary upheavals of its peripheral mountain ranges, a Tertiary sea, perhaps at first connected with the Mediterranean and Arctic, appears to have shrunk till in late Tertiary time it washed the oldest shores indicated on Konshin's map (fig. 467). From that it withered into an Aral and Caspian with shores below those of to-day. This fact, recognized first by Davis, is demonstrated on both sides of the Caspian, where valleys dissecting its high-level Tertiary sediments are contoured up to 200 feet and higher by shore-lines of its later Quaternary expansions, but extend down under water or