tible tendency in these ridges to range themselves in one general northeasterly direction, when they might be likened to a series of long, low waves, or ground-swells. In many instances the crest of each ridge had cracked open into a fissure which presented along its walls a series of tolerably symmetrical columns (Fig. 70). That these ridges were original undulations of the lava, and had not been produced by erosion, was indicated by the fact that the columns were perpendicular to their surface, and changed in direction according to the form of the ground which was the original cooling surface of the lava. Though the basalt was sometimes vesicular, no layers of slag or scoriæ were anywhere observed, nor did the surfaces of the ridges exhibit any specially scoriform character.

There are no great cones whence this enormous flood of basalt could have flowed. It probably escaped from orifices or fissures still concealed under the sheets which issued from them, the points of escape being marked only by such low domes as could readily be buried under the succeeding eruptions from other vents.[139] That it was not the result of one sudden outpouring of rock is shown by the distinct bedding of the basalt, which is well marked along the river ravines. It arose from what may have been, on the whole, a continuous though locally intermittent welling-out of lava, probably from vents on many fissures extending over a wide tract of Western America during a late Tertiary period, if, indeed, the eruptions did not partly come within the time of the human occupation of the continent. The discharge of lava continued until the previous topography was buried under some 2000 feet of lava, only the higher

[139] Captain Dutton has remarked the absence of any conspicuous feature at the sources from which some of the largest lava-streams of Hawaii have issued.