nearly similar was engraved in the plate of Lieutenant Burnes' coins, Plate XI., fig 17, page 318 of vol. ii.

Fig. 28, from the same source as the last, is also nearly a duplicate of fig. 14, of the above plate, except that it has the *sinha*, a lion, for reverse, instead of the horse; the letters correspond exactly, but though individually distinct enough, I can make nothing of the content.

With these I close my present notice, not I fear, before I have tired out many of my readers! and it is with some compunctious feelings towards all but the few whose zeal in the cause of Indian numismatology equals or surpasses my own, that I announce my having received fresh materials, from various quarters, wherewith to revive the subject in the ensuing year. Mr. Masson's second memoir must also find a place in the January number. On some future occasion I hope to be able to strike off a fresh edition of the coin plates, and to gather all that has been written on the subject, into a distinct volume, when the train of discovery shall begin to relax, and the materials scattered through the pages of the journal may be supposed to comprise most of the varieties of the ancient coins of India*.

IV.—*Geological Observations made in a journey from Mussoorie (Masuri) to Gungotree (Gangautri).* By the Rev. R. Fraser.

Mussoorie is situated upon the outermost ridge of the Himalaya mountains, which these ranges is made from N. W. to S. E. nearly, and presents a bold escarpment towards the valley of *Dehra*, or the *Dún*, above which it rises to the height of nearly 4000 feet.

This ridge consists of beds of compact limestone alternating with others of a soft slate with an earthy fracture, and exhibits certain characteristics, both in its mineral structure and in its general outlines, analogous to the transition limestone of the north of Europe, and the mountain limestone of England. Its most general colour is bluish black, and from this it passes through grey to greyish white, and again, on the other side to perfect black, not differing there from the lucullite, or compact black marble (as it is called). It is carboniferous: it is highly cavernous. Many varieties emit a fetid smell, probably of sulphuretted and carburetted hydrogen: indeed where the rock is quarried, the smell is similar to that at the mouth

* I issue with the present number a continuation of the Appendix of "Useful Tables," containing Genealogical Tables of the principal Hindú dynasties, which will assist the reader very much in understanding the allocation of the various series of coins described above: the tables were formed principally with this view.

of a coal-pit. These carboniferous or coaly varieties have, however, one peculiarity. They are in some places highly vesicular, so much so as to resemble a grey lava; and in this state appear to have partially suffered from the action of heat. Mr. Fisher, in his account of the Mussooree limestone, (see Gleanings for May, 1832, p. 194) states that it is "highly crystallized," but I did not meet with any such rock during my stay in the neighbourhood, nor see any specimens of it.

The slate that alternates with the limestone is of various colours, bluish black, grey, greenish grey, brownish red, purplish, and yellow. It is generally soft, and crumbling, and will not split into large plates: but about two miles west of the station, below the peak called *Hutti-paon* and nearly half way down the hill, a bluish black variety is found, hard enough to be used as a roofing-slate. Somewhat to the west of this, on the *Dudhillee* hill (a station of the Trigonometrical Survey), a trap rock makes its appearance. It is to be met with at the bottom of a small water-course, and may be traced for about half a mile in a direction nearly parallel to the range of the mountains. It is composed in some parts principally of compact white felspar and green diallage, in others principally of hornblende. It was not possible to trace the manner of its connection with the adjacent strata, which are evidently much disturbed, though they had not suffered any change in mineral character by contact with it. Probably it has cut through them as a dyke, and the continuation of it may again be met with about a mile to the eastward, where a black heavy trap is to be seen, containing crystals of bronzite imbedded. The general range of these alternating beds of slate and limestone appears to be nearly parallel to that of the direction of the mountains, but not exactly so, as it approaches somewhat more to a north and south line, the dip being a little to the northward of the east, and the angle of it from 20° to 30°. The slopes are very steep, usually covered with a luxuriant vegetation, and remind us of those in Cumberland and Derbyshire, though, of course, on a much larger scale. In the Mussooree rock, however, there is a great deficiency of mineral veins. As we travelled eastwards from Mussooree to Landour, we found, a short distance beyond the hospital, quartzy-sandstone, of a white and greyish colour lying upon the soft, earthy slate. This appearance continued four miles further on to Soakolly, the quartzy-sandstone capping the peaks, and the slate underlying it. From Soakolly we descended for several miles, in a N. N. E. direction, over alternating beds of quartzy-sandstone and slate, to the Agilwan river, which runs with a westerly course to the Jumna. The slate,

which alternates with the quartzy-sandstone, often becomes a distinct grey-wacke, consisting of a greyish green base, with numerous angular fragments of clay-slate imbedded. No such appearances could be observed in the slates which alternate with the Mussooree limestone, and this circumstance, coupled with that of superposition, seems to mark the quartzy-sandstone as the newest formation of the two.

To the north of the Agilwar, we passed over one more ridge of apparently similar composition to the one just described, and then descended into the valley of the Ganges. This valley, where we came upon it, is full a mile broad, and exhibits at different heights, say from 2 to 300 feet above the present level of the stream, flat terraces of gravel, containing boulders, from the size of a pumpkin downwards, perfectly similar to what form the present bed of the river. These appearances continue all the way to its source. In the bed of the river and the precipitous banks that enclose it, we found strata of blue slate, hard and splitting into large plates, uniform in colour and general character, and inclined at a considerable angle to the N. E.—a slate widely different from the soft and parti-coloured varieties, that alternate with the limestone of Mussooree. As we advanced northwards, where our road led us to a considerable height above the river, we met again with a limestone and slate similar to that at Mussooree, and the overlying quartzy-sandstone, apparently capping all the heights in the neighbourhood. At the end of our second day's march along the course of the river, the quartzy-sandstone had become the predominant rock, and the slate had nearly disappeared, being only found in the lowest ground opposite Ballahaut. The line of junction of the two was seen only a few feet above the level of the river. Somewhat before this, the slate had partly assumed the character of talc-slate, having a faint glimmering lustre, and a soapy feel. Beyond Ballahaut we continued travelling near the line of junction of the two formations, the slate gradually passing into a perfect talc-slate, and the quartzy-sandstone becoming rather more crystalline than before. Perhaps the name of quartz rock might be more appropriate to it, though it still exhibits in some places traces of round grains agglutinated together. About Batwaree, two marches in advance of Ballahaut, the quartzy-sandstone ceases on the low ground and the slate contains a mixture of quartz and felspar forming a talcose gneiss, with hornblende occasionally intermixed. Traces of the quartzy-sandstone yet remain upon the cliffs above for some miles farther to the north, where a gradual passage of it may be observed into the talcose gneiss. We found this talcose gneiss for two marches further to the north, containing, however, at times a

good deal of mica, and, rarely, garnets. The valley in which the river flowed had become narrower day by day, and was now nothing but a channel of the breadth of the water course, from which cliffs nearly perpendicular rose, on either side, to the height of several thousand feet, shewing a section of the different beds from the top to the bottom. The rock was evidently approximating to a real gneiss, but it was not until the third day's march from Butwaree, between Dangal Dhurmsála and the village of Sookee, that a gneiss and mica slate formation appeared in its usual features of grandeur, and with its usually-accompanying minerals. Here the river flows in a cut through a ridge, which to the west forms the snowy peaks from which the Jumna takes its rise, and continuing to the east, always above the line of forest, and often far above that of perpetual snow, runs to the south of the temple at Gungotree. Bare precipices, thousands of feet in height, and pinnacles thrust into the sky—those characteristic pinnacles which in other countries have received the names of *horns*, *spids*, and *aiguilles*, and here are called by a term of similar import, *kantas*, present themselves prominently to our view—and as we climb over the ruins below, among blocks bigger than houses, by the side of which the foaming river runs, we find a well-defined gneiss and mica slate, with kyanite and garnet imbedded. A thin stratum of coarse-grained snow-white marble was also seen. On approaching the village of Sookee, white layers and veins were seen in the cliffs that overhung us. They were composed of a coarse-grained granite, containing crystals of black tourmaline imbedded. This granite is seen in the mass a short distance further on, where the river takes a sharp turn to the eastward towards Diláree. Here the precipices on the northern bank were composed of mica slate overlaid by a rock, the rounded outlines and bare ruggedness of which indicated granite. About a mile beyond Diláree the line of junction changes from the horizontal to the vertical. Both rocks may be traced in contact for several hundred feet upwards, but the slate does not appear to have been at all disturbed by contiguity of the granite. The dip is here, as it has been throughout the whole of our journey, between N. and E., with little or no variation. We met with granite further on, all the way to Gungotree—granite often having mica rarely, and acicular crystals of black schorl abundantly imbedded. Yet, besides the ridge of snowy "aiguilles," which runs three or four miles to the south of us, and peers everywhere above the intermediate rocks, another similar one is seen to the north of us, which meets the first at an acute angle, a short distance beyond the temple at Gungotree. Both these ridges, from their peculiar outlines, must be

of mica slate, or gneiss. We find too on our way masses of slate several feet accross lying in the granite, and pieces again of the size of a brick, as if they had been imbedded in it in a state of semifusion, so as to form an irregular gneiss. But these appearances are only partial. This granite appears to range in nearly an east and west line. We have crossed three different masses of trap on our journey, besides the diallage rock, I mentioned, to the west of Mussooree, viz. one on the ridge before descending into the valley of the Ganges, and two others in the clay-slate, and talc slate. We could not, in either case, trace their connection with the surrounding rock: but we probably crossed them at nearly a right angle, and, if so, their ranges must approach to a parallel with that of the granite. They had all the characters of a common greenstone. From Gungotree to Diláree, the river runs through a gloomy chasm in the granite; the branch from Gungotree has rather a dingy hue, but the northern one called the Melung, that comes from Tartary, is, indeed, a beautiful water—as blue as the Rhone when it issues from the lake of Geneva. As the stream becomes larger below Sookee, it is a grand and singular object—with a body of water as great as that at the falls of Schaffhausen, perhaps much greater, it preserved the appearance of a mountain brook during the whole of the time we saw it. There is no perpendicular fall, but the slope is so great that it tumbles and foams over the rocks for the entire distance.

To recapitulate the rocks observed in the order of succession, they are—1, granite; 2, gneiss and mica slate; 3, talcose gneiss and talc-slate; 4, clay-slate; 5, Mussooree limestone; 6, quartz-rock, or rather quartzy-sandstone, and grey wacke slate.

The relative position of these two last, however, needs farther investigation, for there are undoubtedly seams of quartzy-sandstone alternating with the Mussooree formation; one in particular, several feet in thickness, may be observed near the bottom of the hill, just above the village of Rájpoor.

V.—*Note on the Fossil Camel of the Sub-Himálayas. By Lieut.* W. E. Baker, *Engineers.*

With reference to a doubt expressed in your Journal for September, the specimens of "Camelidæ" now in our possession, will, I hope, be sufficient to establish the existence of that genus in the fossil state.

They are: A cranium, with portions of both rows of upper molars, shewing also the occipital and parietal bones, so peculiar in the camel.