Panama to Valparaiso, by Mr. James Douglas, and an account of a visit to the "Wonderful Rivers of Cambodia," by Mr. Frank Vincent.

DR. CREVAUX, the explorer of French Guiana, is not yet, it seems, coming home, but will attempt to reach the Andes by the Iça or Putumayo, exploring that water-system as he has already done the Marori, Ozapok, Yary, and Para.

OUR ASTRONOMICAL COLUMN

BIELA'S COMET.—Even if the earth should encounter an unusual number of meteors on arriving at the descending-node of Biela's comet next month, as some have anticipated, the display is likely to be masked to a considerable extent by overpowering moonlight. The earth will reach the node (so far as we can judge of its actual position) on November 27, and the moon will be full on the following day. Remembering that the meteors of 1872 were not generally remarkable for brightness, though there were some notable exceptions, should there be a return of the shower, a large proportion may escape notice. No doubt, however, a strict watch will be maintained during the last week in November. We are not able to judge how near we may be to the meteoric mass which the earth met on November 27, 1872; it would arrive at perihelion at the end of December in that year, but we do not know the exact period in which it was revolving.

It is worthy of note that the effect of the differences of mean anomalies and mean motions when the two nuclei of the comet were last observed in 1852, would in 1879 occasion a difference in the times of perihelion passage to the extent of nearly $3\frac{1}{2}$ days, and the mutual distance of the nuclei would be increased to 0.075 of the earth's mean distance from the sun, or nearly 7,000,000 miles.

Between the year 1772, when the comet was first observed, and 1852, when the last observations were obtained, the node had retrograded upwards of 11° , the perturbation being chiefly caused by the planet Jupiter in 1794, 1831, and 1842.

When we consider the conditions under which Biela's comet appeared in 1805, we are struck with the favourable opportunity which the repetition of such a case may afford for a precise determination of the solar parallax. On the evening of December 8 in that year the comet at transit at Greenwich was distant from the earth less than 0.038, and its horizontal parallax was upwards of *four minutes*; at this time, with a declination of near 24° south, it was rapidly descending below the horizon in Europe, still it was well observable, and of course would have been in a very good position for observation at the Cape of Good Hope. Its appearance also was favourable for accurate observations, which is more than can be said of all comets that have approached near to the earth. Olbers mentions that on this evening when he was observing with Bessel, the nucleus was very small and defined like a planet, and Gauss at the same time compares it to a star of the third or fourth magnitude. There has been no such opportunity since the Cape Observatory was established.

THE GALLERIES OF THE CUTTING ANTS OF TEXAS

MR. MCCOOK, the devoted student of insects, has in preparation a memoir, which will be looked for with the intensest interest, resulting from his prolonged investigations into the life-history of the cutting or "parasol" ants of Texas (*Atta fervens*), bidding fair to rival his work upon the agricultural ants.

First, let us take with Mr. McCook a brief view of a denuded surface on a high grassy prairie, covered with a number of small moundlets of fresh earth-pellets, yet

without a sign of life, and looking entirely abandoned; over its surface were seen little heaps of dry twigs and pieces of leaves. But towards evening, hosts of ants hurried out, and formed two long double columns to the top of an overhanging live-oak. The ants in the descending columns all carried above their heads portions of green leaves, whence they derive their popular name of "parasol" ants. The closing of the gates in the morning came to pass thus:—Bits of dry twigs and leaves of various lengths are carried into the gallery, filling it up from half an inch to an inch and a half below the surface; often the galleries slant inwards, even to 45° ; or divide soon. The larger "castes" carry in the refuse; as the hole closes the smaller castes appear. The "minims," in small squads, fill in all interstices with minute grains of sand, and finally the last steals in behind some bit of leaf, and the establishment is closed. The reverse takes place, when outside work is resumed in the evening. When the larger forms get out they at first carry away and drop their burdens, and little seems to be accomplished for a long time. But in a marvellous way there occurs a final rush, by which the gate is opened. The bigger pieces of twigs are evidently regarded as special treasures, and were seen used on several successive days. The use of the smallest castes is thus found; some remain at only one-sixteenth of an inch long, while the fertile female attains nearly an inch, and the male is three-fourths of an inch long. The interior of the formicary is composed of caverns or pockets communicating with the surface and with each other by tubular galleries. The chambers contained masses of very delicate leaf-paper wrought into rude combs. Some masses were hemispheres in shape, others were arranged in columns two and a half inches high, in contact, along the floor of the chambers, whose dimensions might be nearly three feet by one foot, and eight inches high. Some hung from tree-roots which passed through the chamber. All this material was composed of the fibre of leaves reduced to this form within the nest. In each portion of ant-comb the cells were nearly hexagonal, but very varied in size, some being half an inch in diameter, but most of them as minute as one-eighth of an inch. Large circular openings ran into the heart of the mass. Ants of the small castes were very numerous in these cells. The material of the comb was very fragile and perishable. It is supposed by Mr. McCook that the ants feed upon the juices of the leaves, but this waits further confirmation. Some of these chambers are even of very large dimensions; one of the size of a flour-barrel was seen, being the main cavity of a formicary, in which were found very many winged males and females and larvæ. This was situated 669 feet from a tree that stood in the front yard of a house, which these ants had stripped. Mr. McCook took a plan of the underground way traversed by the ants to reach this point; the course varied very little from a straight line; two branches had been made to a peach orchard 120 feet distant. Only the small forms appear to take part in the digging, while the larger assist in opening the gates, make the excursions, and do the leaf cutting. The least forms, or minims, assist in opening and closing doors, and taking charge of larvæ. The minims are quite ferocious in attack, and gallantly support the large-headed soldiers. The process of leaf-cutting has been so successfully observed by Mr. McCook, that it is quite deserving of further notice, which we hope soon to give.

G. T. BETTANY

ROUTES TO CHINA *via* ASAM

THE possibility of connecting India with China by a tolerably direct and easy trade route overland is a question of increasing interest to us all, in India and England. Not only would such a route benefit the large valley of Asam, by causing an influx of labour more or