

By taking advantage also of the bright planets passing the meridian in the day time good observations can be obtained for latitude and longitude *at the same time* (a great point), whilst the sun is above the horizon, as well as at sunrise and sunset, when by Sumner's method three or more stars can be combined to give the position. We admit that constant practice is required to take these observations accurately, but they *can* be obtained, and as it is very useful to be able to make certain of a ship's position, as often as possible, all officers should practise themselves in observing both Venus and Jupiter with the sun above the horizon.

Whilst however not agreeing with Capt. Wharton on some few points, we think his work will be found most useful, not only for young officers taking up surveying but also as a book of reference for older surveyors, and personally feel much obliged to him for combining in one volume so many useful remarks and tables which have hitherto been only in MSS. or pamphlets.

THE HORSE IN MOTION

The Horse in Motion as shown by Instantaneous Photography; with a Study on Animal Mechanics, founded on Anatomy and the Revelations of the Camera, in which is demonstrated the Theory of Quadrupedal Locomotion. By J. D. B. Stillman, M.A., M.D. Executed and Published under the Auspices of Leland Stanford. (London: Trübner and Co., 1882.)

THE above is the somewhat long title of a large and important work issuing from the well-known Cambridge (U.S.) University Press. Long as is the title, the name of the principal contributor to the volume is left unrecorded there, though indeed even a cursory glance over its contents shows how much indebted is the whole question of the mode of motion in the horse to the elaborate series of investigations of Mr. J. Muybridge.

Leaving aside the anatomical and teleogistic arguments of Dr. Stillman, as contained in some hundred pages of letterpress, we cull from a postscript to the same the following interesting information, which we give as we find it in the book. Some time in 1872, Mr. L. Stanford, of Palo Alto Farm, in California, had his attention called to the very controverted question as to the action of a trotting horse, and conceiving the idea that the photographic camera might be made available to illustrate the action, he, according to the authority before us, consulted with Mr. Muybridge and induced him to undertake some experiments in instantaneous photography. Some ten years ago, a photograph taken in the space of the one-twelfth of a second was considered quite a success, and it would seem that the experiments made then by Mr. Muybridge were inconclusive. In 1877 Mr. Muybridge, however, renewed his experiments. A few pictures were taken of "Occident," a noted trotter belonging to Mr. Stanford, while he was in motion, and one of these, representing the horse with all his feet clear of the ground was enlarged, retouched, and distributed. This result was so extraordinary and so successful, that it was determined to try others on a more extended scale. It was assumed that if one picture could be taken instantaneously, an indefinite number might also be taken, and so the various positions assumed by the horse in a single complete stride could be illustrated.

Mr. Muybridge was authorised to procure the needed apparatus, and a building suitable to the purpose was erected on Mr. Stanford's farm. By 1878 preparations were complete, and every resource of the photographic art had been provided. Twelve cameras were placed in the building at intervals of twenty-one inches, with double shutters to each, and these shutters were so arranged that the whole series of exposures were made in the time occupied by a single complete stride of a horse. The very ingenious mechanism invented by Mr. Muybridge it would be impossible to describe without the assistance of illustrations, but it may be stated that he was thereby enabled to double the number of his cameras, and the whole of the large series of twenty-four figures each, which are used to illustrate this volume, were taken by him. They were very accurately taken, and the heliotypes are perfect transcripts of the original photographs.

Thanks to the zeal and energy of Mr. Muybridge, and the liberality of Mr. Stanford, we are now enabled to see for ourselves the various attitudes assumed by a horse in running, trotting, leaping, and the result is most strange. It would seem as if most civilised nations had failed to recognise the true action of this noble quadruped, as if all had settled down into being content with a conventional idea of how a horse in motion ought to be represented. Now our artists will have no excuse; they can directly interrogate nature, as represented to them in these silhouettes, no doubt at first they may follow her with fear, for some of the positions look strange, not to say grotesque, but soon both artist and the public will have learnt to recognise the truth: and once this is so, the old style will be in its turn regarded as grotesque, and as representing but an early stage in the development of art.

Mr. Muybridge's photographs will be of immense importance to all art students, and they should be attentively studied by all admirers of the horse. A few other photographs are given in this volume of the various stages of motion in the cow, dog, deer, and boar.

OUR BOOK SHELF

Unexplored Báluchistán: a Survey of a Route through Mekerán, Bashkurd, Persia, Turkistán, and Turkey. By Ernest A. Floyer. (London: Griffith and Farran, 1882.)

AN entertaining book of travel, but by no means an exploration of "Unexplored Báluchistán," as is indeed sufficiently evident from the sub-title. Nevertheless, Mr. Floyer has investigated and partly solved some interesting geographical questions in the little-known province of Bashkurd (Bashakard), on the Perso-Mekrán frontier, which he visited on two separate occasions during the years 1876-7. This region, which had been merely skirted by Goldsmid, Lovett, Ewen Smith, St. John, and others connected with the Perso-Balúch Boundary Commission of 1872, and with the development of telegraphy in Persia and Mekrán in 1873-4, was ascertained to comprise six separate territories or districts—Gavr and Parment in the east, Jagda in the west, Marz and Pizgh north and south respectively, and Daroserd with the capital, Angurhán, in the centre. The town, which appears to be a place of great natural strength, was found to lie in 26° 40' N. lat., 57° 55' E. long., or about thirty miles from the position assigned to it on Major St. John's map. The Aphen-i-Band range, between Daroserd and Pizgh, was crossed near its western extremity, and ascertained to run east and west under 26° 30' N., at a mean elevation of 3600