the phenomena of meteorological optics had, I believe, been worked out by Babinet about ten years earlier.

As to the vertical pillar of light frequently observed in high latitudes after sunset and before sunrise, and occasionally seen in latitudes as low as ours, it may be attributed to spiculæ of ice which, whether isolated or radiating from a centre as in crystals of snow, will assume a horizontal position if they subside through a portion of the atmosphere which is quite free from convection currents. Those of the horizontal spiculæ which are vertically over the cone connecting the spectator's eye and the sun will include some that can directly reflect solar light to his eye, and it is these that produce the phenomenon which was seen by Mr. Knight. The pillar may be expected to be white till the sun gets some distance below the horizon, when it will in succession assume the colours due to the absorption and dispersion of light by the atmosphere.

It can easily be shown experimentally that if the air be free from the minute convection currents which so trouble astronomers (which it seldom is), then subsiding spiculæ of ice will be horizontal. To show this, cut from a sheet of stiff paper a straight, long and narrow strip, and let it fall through the air. The experiment is a pretty one when the strip of paper is thrown out of an upper window on a calm day. The strip falls not lengthwise, but sideways, and spins round its long horizontal axis. The dynamics of this phenomenon have not, I think, as yet been worked out. The explanation would require an investigation of the stream lines surrounding a body rotating as well as progressing through a fluid. It seems to be a problem which might with advantage be proposed to the mathematical research scholars of our Universities.

30 Ledbury Road, W., March 16. G. JOHNSTONE STONEY.

Proofs of Euclid I. 5.

BESIDES the proofs cited by Prof. Bryan (p. 438), another is equally worthy of notice, and requires no construction. The sides of the triangle ABC may be regarded as taken in two orders—

$$\begin{aligned} &AB, AC \text{ and } \angle A \\ &= AC, AB \text{ and } \angle A \\ &\therefore \angle \text{ opp. } AB = \angle \text{ opp. } AC. \end{aligned}$$

This is a variation of the proof by duplication, but avoids this process. As in the case of the proof cited by Prof. Bryan and involving limiting values, the proof given above is not altogether satisfactory for the use of beginners, and is, of course, of no value to the advancing student except as an interesting illustration of method. H. W. CROOME SMITH.

Bristol, March 15.

As Prof. Bryan is discussing proofs of Euclid's I. 5, may I call attention to the way I proved it in my "Foundations of Geometry," namely as a corollary to the equivalent of I. 4? Thus—

"For if AB in the above proof had been equal to AC, the triangle ABC might also have been moved so that AB fell on DF, and AC on DE, and the triangles would have been congruent so. Hence both the angles ABC and ACB would be shown to be equal to DEF, and therefore to each other."

This seems to me far and away simpler than any other proof I know of, and it has the advantage of directing attention to the fact that the proof of I. 4 as often as not involves turning the triangle over in the air, while moving it; so that, for example, the proof would not apply as it stands to spherical triangles. EDWARD T. DIXON.

Racketts, Hythe, Hants, March 16.

THE NATIONAL PHYSICAL LABORATORY.

SOME further account of the National Physical Laboratory, which is being opened by H.R.H. the Prince of Wales, accompanied by H.R.H. the Princess, as these lines go to press, may be of interest to readers of NATURE. A description of Bushy House, with plans, has already appeared; the alterations required to fit it or a laboratory are now complete, and the new buildngs erected for the engineering department are ready or use. The following extracts from the report of the executive committee will indicate what has been done:—

The basement and ground floor of Bushy House have been transformed into a physical laboratory, while the upper floors form offices and a residence for the director. The basement is covered with a brick groining, on which the main building rests, but the more important laboratories are in four large wings, one at each corner, and these have no basement below, thus steady supports are everywhere possible.

One wing, containing the original dining-room and library, has been fitted as an electrical and magnetic laboratory. All iron has been, as far as possible, removed from the structure, and, with a view of preventing a stray magnetic field from any currents which may be used, concentric wiring has been employed for all large currents, while the wires for smaller currents have been twisted.

In this room will be placed the Lorenz apparatus which the Drapers' Company has recently with great generosity given to the Laboratory in memory of the distinguished services to science and to education of the late Principal J. V. Jones, F.R.S., of Cardiff. Along with this there will be other apparatus for the absolute measurement of current and of electromotive force.

Another wing has been fitted for thermometric work. A special study will be made of high-temperature thermometers, and the laboratory owes to the generosity of Sir A. Noble the means for installing a number of electric ovens for testing thermopiles and other instruments for the measurement of temperature up to 1000° or 1200° Centigrade.

In a third wing a metallurgical laboratory has been fitted in which to continue the work begun at the Mint by Sir William Roberts-Austen and the Alloys Research Committee. For this purpose apparatus for cutting and polishing sections and further photomicrographical examination has been obtained. The committee has to thank Mr. Stead for his assistance in arranging this. The fourth wing is fitted as a chemical laboratory. In the basement are a number of constant temperature rooms.

Sir Andrew Noble's fund, referred to in the last report, has provided a measuring machine, a dividing engine and a comparator, which will be placed in some of the basement rooms. In an adjoining room the resistance measurements of the British Association Committee will be continued, while in another, apparatus for the production of liquid air is being set up. The testing of pressure gauges will form an important branch of the work, and for this a mercury column some fifty feet in height has been erected in one corner of the house.

Gas and water have been laid on freely throughout the building—also electricity. A 100-volt circuit is connected to the main dynamo and battery in the power-house, and supplies light. Numerous plug points enable a supply to be taken off for lights for experimental purposes or for small motors. For experimental work a special battery of fifty-five cells has been installed. This is divided into groups of five. Wires run from the switch-board to the various rooms in such a way that one or more of these groups can be switched on to any circuit. Thus voltages between 2 and 110 volts can be obtained as required.

The house is heated on the Webster low-pressure system by steam from a Lancashire boiler in the boiler-house at a distance of about 100 yards. The boiler also supplies steam to one of Parson's 60-kilowatt turbo-generators, which is the main source of power. The power-house also contains an 18-h.p. Crossley gas-engine, driving a 12-kilowatt dynamo by T. Parker and Co. This serves as a stand-by and for charging the main battery of fifty-eight chloride cells.

The engineering laboratory, a building eighty feet by fifty feet, adjoins the power-house. This is divided into two bays; a shaft, driven by a motor supplied by Mather