

in the manner of a skein of thread." I do not know of any explanation of the use of these threads. Can any of your readers suggest a purpose for them?

JOS. F. JAMES.

Cincinnati, O., Aug. 2, 1883.

Seeds of *Lepidium*.

I regret to observe, by your issue of July 27, that my employment of the expression 'mucilaginous threads' as to the seeds of *Lepidium* has led your reviewer to understand that I referred to something like the seed-fibres of *Collomia*. Spiral fibres embedded in mucilage are found on the seeds of *Collomia*; radiating processes consisting of mucilage, each tipped by a facet of cuticle, are emitted by the seeds of *Lepidium virginicum*. This is shown on the application of water with staining-fluid to ripe seeds. Other species of *Lepidium* (including *L. ruderale*) show the same phenomenon, though the experiment may fail with immature seeds or old herbarium specimens.

G. MACLOSKIE.

Princeton, N.J., Aug. 3, 1883.

["The exotest may bear long hairs (cotton) or spiral threads. . . . In *Lepidium* (pepper-grass), on being moistened, it darts out mucilaginous threads." It certainly may be gathered from this that the 'spiral threads' and the 'mucilaginous threads' are not the very same. But the darting-out of mucilaginous threads so well describes what one sees in *Collomia*-seeds and the like, and so poorly answers to what takes place in those of *Lepidium*, that the reviewer supposed there might be some mixing up of cases. But he simply asked whether the author was sure of the threads in *Lepidium*. We find nothing to which the name of 'mucilaginous threads' can with any exactness be applied; nor do we think that the term now used of 'radiating processes,' though not widely amiss, gives a clear idea of the case, which we should describe thus:—

A superficial pellicle of the seed-coat of *Lepidium* consists of a single and continuous layer of cells, the thick walls of which are at maturity converted into mucilage, or into an isomer of cellulose, which swells up into mucilage 'upon the application of water.' But the water acts so promptly in forming the *limbus* around the seed or its section, that we fail in that way to get an intelligible view of the structure and the nature of the process. To do this, however, we have only to soak thin sections of the seed in strong alcohol, examine in them the unaltered mucilage-cells, and then add a little water by degrees. The cells then swell up slowly, push outward radially (for mutual pressure prevents lateral expansion at the beginning), become wedge-shaped or pear-shaped as they farther protrude, and at length form the well-known mucilaginous *limbus*. Dr. Macloskie will be interested in repeating this experiment, and will accept our apology for partially misunderstanding him.]

KONKOLY'S ASTRONOMICAL INSTRUMENTS.

Praktische anleitung zur anstellung astronomischen beobachtungen, mit besonderen rücksicht auf die astrophysik, nebst einer modernen instrumentenkunde. Von NICOLAUS VON KONKOLY. Braunschweig, Vieweg, 1883. 912 p., 345 illustr. 8°.

This is an important but at the same time a disappointing work. It contains the descrip-

tion and representation of nearly all the principal modern astronomical instruments, and presents such a comprehensive summary as can be found in no other existing book. The numerous illustrations, largely derived from the business catalogues of leading instrument-makers, are generally excellent, and the mechanical execution and press-work are admirable. Undoubtedly the book is one which must have a place in every astronomical library.

At the same time, the work is far from exhaustive, omitting all mention of many of the latest and most useful improvements; and it is not always accurate in its description of those it does notice. Nor does it deal in any thorough or satisfactory manner with the theory of the instruments described. It is so full and so good, that it is a great pity that it is not still better and still more complete, as it easily might have been.

The first chapter, on time-keepers (*uhren*), describes, among clock-escapements, only the old Graham dead-beat and a duplex of Jürgensen's. There is no notice of Airy's detached escapement, now in use at Greenwich, nor of any of the numerous and excellent gravity-escapements now so common in England and this country. The account of electric make and break circuit apparatus is for this reason unsatisfactory, since only escapements of the detached class admit of a simple break-circuit which does not affect the pendulum. The author treats the subject rather extensively, describing no less than twelve different forms of contact apparatus, some of them very elaborate and complicated. The antiquated contrivances of Locke and Mitchell are described as if they continued to be in use.

The second chapter, a short one, deals with the different forms of levels and level-testers, and appears to be in all respects satisfactory.

The third chapter treats of instruments for the determination of time. Under this head are included not only transits and transit-circles, but all forms of theodolites, sextants, passage-prisms, etc. There is also a certain amount of information respecting the graduation of circles and the methods of testing their accuracy, i.e., the optical and mechanical arrangements; the mathematical theory remaining untouched.

The next chapter, the fourth, is by far the most extensive and full of any, occupying two hundred and forty-six pages. It treats of equatorials and their mounting, and describes and illustrates nearly all the important modern telescopes. For the most part, it is well done, especially the portion relating to driving-clocks,