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PERSONAL KNOWLEDGE.

Hidden or occult knowledge might have been once a part of the mental paraphernalia in which scientists dressed their discoveries and inventors concealed their improvements. But occult knowledge is not a thing of the past, even in these days of mechanical exactness and experimental demonstration. It is possible for a workman to hold some method or process so securely that, even if willing, he may find it difficult to impart it to a learner. This statement does not refer to "tricks in the trade" which are mere mountebank pretensions, but to real knowledge of absolute value that cannot readily be imparted. When a man is found who possesses this knowledge in any department of mechanics, he is a valuable man; what he knows on his own specialty he knows thoroughly. There can be no question that Cicero's statement, "Poeta nascitur, non fit," is an absolute truism when applied to some workers in mechanics—they are not made, but they were born, mechanics.

Illustrations of this fact are probably familiar with many experienced and elderly mechanics. There is a tool maker in an extensive establishment in which coiled springs of steel wire are largely used. The springs are wound from the annealed wire, and after being completed are hardened and tempered. Some of them are "open" and some are "close" springs. Out of 22,000 springs, of which an account was kept in consecutive workings, only six springs failed the severe trial test. The temperer was unwell and out for eight working days, and of the springs hardened and tempered by the assistant, who had a year's instruction, less than one-half passed the test. In this case the writer has reason to know that the temperer had used his best endeavor to have his assistant his ultimate successor. Some lack of sensible impression made by heat and color on feeling or on sight must have been the cause for the difference between the result of the assistant's work and that of his teacher.

There is an old machinist now living, but superannuated, who was famous in his day for his superior hand-made edge tools. A pocket knife with a restored blade of his workmanship was doubled in value because he had made it. This was before the manufacture of cutlery had been attempted in this country. His two sons succeed him, but they have never been able to equal their father in this direction.

At a large manufactory of sword blades for army purposes, masonic and other regalia, one man has tempered them for many years. Although he has been engaged in other business for years, he is called whenever a batch of blades are to be tempered. Although he is willing to impart verbal instruction and help a learner, he has never had a pupil to equal him.

There is a large scythe manufactory in a New England town, making 14,000 dozen scythes a year, and the president of the company has for years hardened and tempered every scythe that leaves the works, because no other man in the works can do it so well.

COMETS AND ASTEROIDS OF 1884.

The past year does not present a record of numerous or brilliant additions to the cometary family. Although six comets have some claim to a place on the list, there are but two that strictly fulfill the conditions of comets newly discovered whose perihelion occurs during the year.

The first cometic excitement took place on the 7th of January, when Ross, an amateur observer at Elsternwick, near Melbourne, Australia, discovered one of these celestial will o' the wisps. Its characteristics were of the negative order. It was very faint and very small, had scarcely any central condensation, and was destitute of that essential cometary appendage, a tail, a small projection supplying the deficiency. It was invisible in the northern hemisphere, and was only seen for a month. Moreover, it had passed perihelion on the 25th of December, 1883, about a fortnight before it was picked up. It has no claim therefore to be ranked with the comets of 1884, but will go down to posterity as a possession of the year 1883.

The first comet of the year in the order of perihelion passage was in reality a rediscovery, though the fact was not recognized at the time. It was detected by Brooks of the Red House Observatory, at Phelps, New York, on the 1st of September, 1883. It was afterward found to be identical with the comet discovered by Pons in 1812, which having completed its long journey of 70 years had returned once more to the clime of the sun. Great was the rejoicing over its advent nearly at the predicted time, and great the satisfaction it afforded in proving that the men of science had made no mistake in laying out the path of the erratic visitor. It took rank as comet a 1884, but is better known as the Pons-Brooks comet. It reached perihelion on the 25th of January, and therefore ranks with the comets of 1884.

The first comet of the year in regular standing, that is, in fulfilling all the required conditions, was discovered by Barnard, of Nashville, Tenn., on the 16th of July, and takes rank as comet b 1884. It was a telescopic object, nebulous, slightly condensed, and passably bright, but not of much account among its class.

There are, however, points of interest in its history. It travels in an elliptical orbit, and has a period of about five and a half years. The closest scrutiny has been unable to detect its appearance at any previous period, though its elements resemble those of comet I 1844, discovered by De Vico. The comets are not thought to be identical, as the interval of time does not correspond with any integer of periods, and De Vico's comet, when similarly situated, was easily visible to the naked eye. Comet b 1884 reached perihelion on the 16th of August, and, if nothing happens to turn its course, may be expected to make another visit in 1890.

The third cometary prize of the year was the most important, not, however, on account of its size or brilliancy. It was discovered on the 17th of September, by Wolf, a student at Heidelberg, Germany, and is still visible. An observer at Dresden describes its appearance on the 21st of September as 2' in diameter, strongly condensed toward the center, and with a stellar nucleus about equal in magnitude to a star of the 8th magnitude. It was in perihelion on the 24th of November, and will take its place on cometary annals as comet c 1884. It was seen on the 21st of October in Alexandria, Egypt, with the naked eye, appearing as a nebulous body condensed in the center and without a tail.

This speck of a comet has proved to be a celestial rover of great interest to astronomers and amateurs. It was found to move in an elliptical orbit with a period of about six and a half years. Diligent search was made to find if it had ever paid us a visit before. Not a trace of its presence could be detected, and no orbit of any known comet bore any marked resemblance to that of the new comer. Where was it in 1871, or in 1878, or how came it in our sky in 1884?

The planet Jupiter solved the mystery. In 1875, when this comet was far away from the earth, it ventured near the giant of the system. Quick as a flash, it was tumbled out of its former path, and made to travel in a new one. We are indebted to this little incident for its appearance in our sky, and, if it keep away from "the great comet disturber," as Jupiter is called, we may hope to see Wolf's comet again some time in 1891.

There was precisely the same condition of affairs with Lexell's comet of 1770, which passed near our big brother, both before and after its advent in our domain, was made to travel in a different path by the force of his attraction, and has not since been seen.

The fourth comet to make us a visit in 1884 was Encke's comet, our oldest friend among comets of a short period, and one that has not failed to reappear once in about three and one-third years for almost a century. Although this comet was seen early in December, 1884, as its perihelion passage occurs on the 7th of March of the present year, it will take rank among the comets of 1885.

The fifth comet of the year may be appropriately called the suspicion of a comet. Tuttle's comet of 1858, with a period of six years and a half, was due in 1884. Schulhof, who determined its period, and computed its elements, announced its probable return sometime during the summer, after three unobserved returns in 1864, 1871, 1877. An observer, using the great refractor of the Vienna Observatory, saw on the 26th day of May a faint nebulous object very near the comet's computed track, which may have been the comet itself and not a nebula. Unfavorable weather prevented further observation, and, when again the sky was cloudless, the shadowy object was no longer visible, nor could it afterward be found. Thus it will never be certainly known if a single observer had a fitful glimpse of our old friend of 1858. The year 1890 must roll into place before we can hope for a return.

One more comet of a short period deserves mention on the cometic records of 1884. Brorson's comet, with a period of five and a half years, discovered in 1846, and last seen in 1879, was expected to make its perihelion passage in September. It was not favorably situated for observation, and the keenest eyed observers did not succeed in picking it up. It will be due again in 1890, when it is hoped that those who are specially interested in periodic comets will have the pleasure of beholding it.

THE ASTEROIDS OF 1884.

During the year 1884, nine new asteroids were added to the troublesome and heterogeneous family, making the whole number of members 244. An additional asteroid was supposed to have been discovered on the 27th of October, by Palisa. It ranked as No. 245, but turned out to be identical with No. 208, Lacrimosa.

The following list introduces the nine new members. Two of them have not yet been honored with names, a fact not to be wondered at when considering the inconveniently large size of the family.

Table with 5 columns: No., Name, Discoverer, Place, Time. Lists asteroids 236-244.