should be replaced by one according to their shrinkage and porosity. Most of the clays tested show expansion at some part of the firing range, owing probably to the allotropic changes in the silica present. In general, clays with high alumina content show a wide range of porosity, but there are notable exceptions. From the tables of the properties of the various clays given by the authors it is possible to calculate the properties of a mixture of them when fired to a given temperature.

CONTINUING his researches on the alloys of iron with chromium and tungsten, Prof. Honda has recently published in the Science Reports of the Tôhoku Imperial University an investigation on the structural constitution of high-speed steels containing these elements. He concludes that in an annealed steel containing 5 per cent. of chromium, 18 per cent. of tungsten, and 0·6 per cent. of carbon the alloy consists of a solution of iron tungstide in iron, together with free tungstide and the carbides Cr_4C and WC. On heating such a steel above Ac_1 the carbides dissolve, and the chromium carbide Cr_4C is converted into Cr_3C_2 and metallic chromium. The higher the temperature, the more the change proceeds in this direction. On cooling, the reverse change takes place only slightly, and the result is that at the ordinary temperature a steel is produced containing the carbides, chromium, and the tungstide all in solid solution. This, according to him, is the constitution of the hardened steel. The self-hardening property is conveniently studied by the temperatures of the transformations, while the degree of tempering on later heating is best studied by means of magnetic heating curves. The tempering takes place in two steps—one at about 400° and the other above 700°. Prof. Honda concludes that self-hardening and resistance to tempering depend primarily on the quantity of Cr_3C_2 dissolved in iron containing chromium and tungstide. These properties increase both with chromium and carbon and with rise of temperature. The function of tungsten appears to consist in lowering the temperature, at which self-hardening begins to be manifest. When this element exceeds 12 per cent. it exists as fine globules of tungstide Fe_2W, and these are directly related to the cutting efficiency of the tool.

WE have just received from W. Heffer and Sons, Ltd., of Cambridge, a catalogue of their library of second-hand books. Science and mathematics are well represented by a number of the bigger text-books, and several collections of bound volumes of scientific journals are also offered for sale.

THROUGH the omission of the word "hundred" from line 28 of the first column of page 38 of last week's NATURE, the annual production of coal in Great Britain was erroneously stated to approach "three million" instead of "three hundred million" tons. It is shown in the article upon the proceedings of the Section of Economics and Statistics of the British Association, printed elsewhere in this issue, that the output in 1913 was 287,000,000 tons.

Our Astronomical Column.

TEMPEL'S COMET.—This comet is now fading, but may still be visible for some weeks. The following ephemeris, for Greenwich midnight, is by M. Ebell:

	R.A. h. m. s.	S. Decl. ° ′		R.A. h. m. s.	S. Decl. ° ′
Sept. 17 ...	3 1 5	8 27	Oct. 3 ...	2 51 44	10 53
21 ...	2 59 45	9 8	7 ...	2 47 59	11 21
25 ...	2 57 42	9 46	11 ...	2 43 50	11 44
29 ...	2 55 0	10 22	15 ...	2 39 24	12 1

Values of log r, log Δ: September 21, 0·2364, 9·9411; October 15, 0·2737, 9·9730.

A photograph obtained at Bergedorf on August 15 showed a well-defined nucleus and a fan-shaped tail which could be traced for about 1′. The corrections indicated to Ebell's ephemeris were +23s., S. 3·0′.

NOVA CYGNI.—The position of this star referred to the equinox of 1920·0 is R.A. 19h. 56m. 24·77s., N. decl. 53° 24′ 1·3″; annual precession, +1·50s., +9·7″. Examination of past photographs shows no trace of a star in this place on plates taken by Dr. Wolf and Mr. Franklin Adams some fifteen and twelve years ago. They go down to mag. 17 and 15 respectively. Two plates taken at Harvard on 1920 August 9 with a 1-in. lens fail to show it, and it must have been fainter than 9·5. A plate taken by Mr. Nils Tamm in Sweden on August 16 shows it of mag. 7, and a Harvard one of August 19 indicates mag. 4·8. Since the maximum was not reached until August 24, the rise in light occupied more than a week. The total increase in light was at least 15 magnitudes, while that of Nova Aquilæ 1918 was only 11 magnitudes (Harvard Bulletin, 729; *Astr. Nachr.*, 5060).

THE PERTH SECTION OF THE ASTROGRAPHIC CATALOGUE.—The publication of the great Astrographic Catalogue has fallen far behind the expectations that were formed when the scheme was initiated some thirty years ago, but many new observatories have stepped in to fill gaps left in the zones, and these are showing much energy in pushing on their share of the work. The Perth Observatory, under the direction of Mr. N. B. Curlewis, undertook the region from −31° to −41°. The Catalogue will be completed in thirty-six volumes, each containing six hours of R.A. in a single degree of declination. Vols. xvii. to xxiv. have recently been issued. The following table gives the number of stars in each volume and the ratio to the number in C.P.D.:

Plate centre	R.A. 0h.–6h. No. of stars	Ratio	R.A. 6h.–12h. No. of stars	Ratio	R.A. 12h.–18h. No. of stars	Ratio	R.A. 18h.–24h. No. of stars	Ratio.
−36°	7,740	4·7	21,923	2·5	20,766	4·1	19,832	5·0
−37°	7,664	4·4	21,883	2·6	20,667	3·5	14,562	3·8

It will be seen that the ratio varies considerably, being, on the whole, lowest where the star-density is greatest.

The radius of the image is given for stars not fainter than magnitude 8. The fainter stars have their magnitudes indicated by a letter (from A to L) referring to a specially constructed scale; approximately A is of magnitude 8½, and the letters are half-magnitudes apart, so that L is 13½.

The *étoiles de repère*, of which there are about fifteen on each plate, have recently been re-observed with the Perth meridian-circle, and proper motions deduced where necessary. The measured rectangular co-ordinates of all the stars are given to 0·001 of a *réseau* interval. The usual plate-constants and tables for reduction to R.A. and declination are also given, with a note that the constants are deduced on a somewhat different plan from that followed at Greenwich.