is effected by passing the cooled vapours through coke columns and sulphuric acid drying-towers; arsenic is thus eliminated, and less than 0·02 per cent. of other impurity (water and inert dust) retained. Details of efficiency and production costs are given.

ALTHOUGH salvarsan (dihydroxydiaminoarsenobenzene dihydrochloride) has proved to be an effective remedy for syphilis, its use in medicine is open to the objection that its administration involves the use of a somewhat elaborate technique. Various attempts have been made to overcome this difficulty, the most successful of which is probably the substitution of the sodium *N*-methylenesulphinate (neo-salvarsan) for the parent compound. Medical opinion on the whole is, however, in favour of the view that salvarsan is more powerful and more certain in its action than neo-salvarsan, though the latter is not without its advocates. In continuation of work begun in 1907 by Prof. F. L. Pyman and his collaborators, Messrs. Baxter and Fargher, of the Wellcome Chemical Research Laboratories, described at the last meeting of the Chemical Society a number of arsenic compounds prepared in the hope that they would be suitable for direct intravenous injection in simple aqueous solution. These compounds are arsenobenzenes of a new type obtained by the reduction of benzodiazolearsinic acids, which in turn are produced by the action of acetic or formic acid on diaminophenylarsinic acid and its homologues. The new arsenobenzenes form dihydrochlorides which are soluble in water, but, though they exhibit a reduced acidity as compared with salvarsan, they still prove to be too acid for direct intravenous injection. These experiments are, however, of considerable interest, forming as they do the nucleus of further work on the replacement of amino-groups by heterocyclic nuclei in arsenobenzenes.

ONE of the latest of the many developments of the Mallet type of locomotive on American railways is a simple or non-compound engine for goods and banking service, built at the works of the Pennsylvania Railroad. From an article in the *Engineer* for November 7 we extract some particulars of this locomotive, which weighs 287 tons, or just above 400 tons with the tender. There are four cylinders, 30·5 in. by 32 in.; the driving-wheels are 62 in. in diameter; the boiler-pressure is 205 lb. per sq. in.; and with a maximum cut-off of 50 per cent. the maximum tractive effort is about 135,000 lb. The size of the boiler is notable; its overall length is 54 ft., including a 14·5-ft. fire-box, 11·5-ft. combustion chamber, 20-ft. barrel, and 8-ft. smoke-box. The barrel diameter is from 8·25 ft. to 9 ft. Expansion movements in the great length of the firebox and combustion chamber are provided for by a folded connection plate forming a **U**-shaped pocket. A mechanical stoker is used, and the fire-box has a shaking grate operated by power. The grate area is 112 sq. ft., the heating surface 6656 sq. ft., and the area of the superheater surface 3136 sq. ft. The short cut-off employed in the Mallet engine as a substitute for compounding has been criticised by writers, who consider that the system does not possess the advantages which it may realise when applied to the usual type of simple locomotive.

Messrs. Blackie and Son, Ltd., announce "Triumphs of Invention," C. Hall. *The Cambridge University Press* will shortly publish "The Foundations of Music," Dr. H. J. Watt. *Messrs. Hodder and Stoughton* are to publish "Aerial Transport," H. Thomas, and "Applied Aeronautics," G. P. Thomson. *Messrs. Longmans and Co.* announce a new edition of Prof. W. Watson's "A Text-book of Physics," revised by H. Moss. *Sir Isaac Pitman and Sons, Ltd.*, have nearly ready "Electric Lighting in the Home," L. Gaster and J. S. Dow, and "Compressed-Air Power," A. W. and Z. W. Daw. *The University of London Press, Ltd.*, promise "Africa and Europe" (being Book iii. of the New Regional Geographies Series). It will include the British Isles and the new boundaries resulting from the Peace Treaty. The section relating to the British Isles will also be issued separately.

IN the official announcement of the reorganisation of the Board of Agriculture and Fisheries which was published in last week's NATURE, it should have been stated that Sir A. Griffith-Boscawen has been appointed deputy chairman, and Sir A. Daniel Hall vice-chairman, of the President's Administrative Council.

OUR ASTRONOMICAL COLUMN.

THE LEONID METEORIC SHOWER.—Observations at the middle of the present month proved that a few of the meteors were visible, and that the display was prolonged beyond its usual duration. On the night of November 15, in $2\frac{3}{4}$ hours, Mr. C. P. Adamson, watching from Wimborne, Dorset, recorded eleven Leonids radiating from 151°+22°. On November 19 he saw five Leonids near their radiant at 149°+23°. The latter result corroborates an observation in 1876 November 19–22 at Bristol by Mr. Denning, who saw five Leonids from 149°+22°. These figures would appear to prove that there is no decided motion of the radiant similar to that affecting the centre of the great Perseid stream. A brilliant meteor was seen by Mr. Adamson on November 19 last at 11h. 5m. It gave a series of flashes near the termination of its course, which was from 120°+21° to 140°+16°, traversed in two seconds.

TWO STARS WITH LARGE PARALLAXES.—Prof. F. Schlesinger gives particulars in *Astr. Journ.* (No. 758) of two stars within 14′ of each other that both have large parallaxes and proper motions, and yet are apparently quite independent of each other. The brighter star is B.D.+4·123°, which was found thirty years ago to have an annual P.M. of 1·4″. The following determinations of parallax have been made:—

Name	Parallax	Prob. error
	″	″
Schlesinger ...	0·15	0·008
Chase ...	0·16	0·048
Flint ...	0·18	0·040

The other star is of the twelfth magnitude, and was independently found by van Maanen and Wolf to have an annual P.M. of 3·0″. Its place for 1900 is R.A. 0h. 43m. 53s., N. decl. 4° 54·4′.

The following determinations of parallax have been made:—

Name	Parallax	Prob. error
	″	″
Schlesinger ...	0·27	0·012
van Maanen ...	0·244	0·008

There would seem to be a fair presumption that the faint star is considerably nearer than the bright one, and hence that their close juxtaposition in the sky is accidental.

The second star is one of the twenty stars nearest to the solar system, and is evidently (like the Barnard and Innes stars) in the extreme dwarf stage. It would be of interest to determine its visual magnitude, which is likely to be brighter than the photographic one.

APHELIA OF PLANETS AND COMETS.—Mr. C. D. Perrine examines the grouping of these aphelia in Proc. Nat. Acad. Sci., U.S.A., September, 1919. The grouping of aphelia of the minor planets about a strongly marked maximum in longitude 195° has been pointed out before. It is shown that the aphelia of the forty-five short-period comets are grouped in the same manner. It is further remarked as a coincidence (it can scarcely be more) that the aphelia of the eight major planets are all situated in the same half of the ecliptic, their centre of mean position being in the longitude of the apex of solar motion. The aphelia of the long-period comets appear to be grouped about two maxima, the most strongly marked being near longitude 90°, the other near longitude 270°. Mr. Perrine notes that these are respectively the longitudes of the antapex and apex, and deduces a theory that the comets are captured from interstellar space. The obvious difficulty presents itself that the great majority of such objects would enter the sun's domain with independent velocities of the order of several miles per second, and their orbits would, in consequence, be strongly hyperbolic. Mr. Perrine escapes from this difficulty by suggesting that practically all these hyperbolic comets would pass too far from the sun for us to see them; we should only see those the independent velocity of which was practically zero. These last would, however, be only a very small fraction (perhaps one in ten thousand) of the comets entering the sun's domain, so the number of these would have to be immensely large to supply the number of parabolic comets that we see. The latter number is two or three a year, so the former number would need to be reckoned by millions every century.

THE BRITISH SCIENCE EXHIBITION, GLASGOW.

AN exhibition on similar lines to those of the British Science Guild's Exhibition of last summer is now being held by the Corporation of Glasgow, with the assistance of a scientific advisory committee. The Kelvin Hall, in which the exhibition is held, was erected for the purpose of holding a series of industrial exhibitions, and the Corporation has a special department for their organisation. The exhibits are housed in a single building and on one level, so that there is ample space for their display, and power is available for setting machinery in motion and allowing demonstrations of high-temperature operations. The exhibits are, therefore, seen under very favourable conditions, and the response to the invitation to exhibit has been very gratifying. Owing to an unfortunate combination of circumstances, several firms which were represented in London have been unable to appear, and the absence of some of the leading instrument firms is noticeable; but many of the London exhibits reappear, in some cases in an enlarged form, whilst there have been many additions, especially in regard to engineering and shipbuilding.

A very large area is covered, and an inspection of the exhibition convinces a visitor that the objects shown were well worth bringing together. The enormous progress made during the war and since the armistice in the manufacture of products for which we were entirely dependent on importation is evident, as is the ingenuity displayed in the design of new instruments and machines, both for warlike and for peaceful use. The relaxation of restrictions in regard to secrecy has made it possible to show many improvements which had been kept secret for military reasons, so that there is a most interesting series of instruments illustrating recent developments in wireless telegraphy and telephony, and a very extensive display of modern improvements in aircraft, as shown by the work of firms in the Clyde area.

Steam turbines and oil engines are well represented, as well as such interesting inventions in marine engineering as variable-speed gearing and hydraulic transmitters. Many systems of high-temperature welding, especially with the electric arc, are shown in operation, and examples of varied uses of this process are shown, including the junction of the vertical framing and the roof principals in a steel-frame building. The coal industry is represented by a full-sized model of a coal seam with electric coal-cutters at work, and there are also exhibits illustrating the utilisation of the iron ores and oil-fuel supplies of this country.

The chemical exhibits are, in the main, the same as those which were shown in London, whilst the metallurgical industries naturally receive special attention. The Health Department of the city shows a large and instructive collection of preparations illustrating the relation between micro-organisms and disease, as well as diagrams relating to the smoke nuisance. Several Government Departments and universities are represented by stands, at some of which demonstrations are carried on. A kinematograph hall is used for showing films of scientific interest in connection with engineering, shipbuilding, and metallurgy, as well as with bacteriology. The educational value of the exhibition is very great, and a most remarkable picture is presented of the capacity of British manufacturers to accomplish good work when advantage of scientific guidance is taken.

The opening ceremony was performed on Monday, November 17, by Sir Charles Parsons, the Lord Provost of Glasgow presiding, and testimony was then given as to the importance of science to industrial progress. The exhibition has the advantage of following closely on a most successful housing exhibition, also held by the Corporation, and visited by enormous numbers of people, so that there is every reason to expect results which will be beneficial to science and to industry alike by bringing the two into closer contact, and in educating the public as to the necessity for a close co-operation between them. The exhibition remains open until December 6.

A NEW ASTRONOMICAL MODEL.

THE illustrious scholar Gerbert (A.D. 940–1003), afterwards Pope under the name of Sylvester II., was apparently the first of the schoolmen who illustrated his theoretical lessons on astronomy by the use of globes, which he constructed with his own hands. About the year A.D. 1700 George Graham invented a machine to show the movements of the earth and planets about the sun, a copy of which was made for Charles Boyle, the Earl of Orrery. Hence the name of an apparatus very useful for illustrating lessons in astronomy, although Sir John Herschel did call orreries "very childish toys." But surely the difficulty in teaching astronomy is to make the young pupil think in three dimensions. What are we going to do when the relativists would have us imagine phenomena in four dimensions?

Some forty years ago the prospectuses of schools generally advertised among the subjects taught "the use of the globes and deportment." Presumably the orderly arrangement of the solar system was to be reflected in the conduct of the pupils. The "use of the globes" seems to have disappeared from the apparatus of pedagogy, although the teaching of geography and the elementary notions of astronomy are very much facilitated by their employment. But