is a camphor glass or chemical weather glass, long acknowledged to be of no real scientific value. The report for 1918 deals with the corrections to be applied to the readings of an unaspirated wet-bulb thermometer in an "Indian" shelter to reduce them to those of an aspirated thermometer at definite wind velocities and for different depressions of the wet bulb. With the lighter wind velocities, of 1–5 m.p.h., and for the larger depressions of the wet bulb, say amounting to 6°–10°, the subtractive correction to the unaspirated wet bulb amounts to 1° or slightly more. Three thousand three hundred and seventy-five observations have been dealt with, but as yet no definite scheme has been decided upon. The matter has been considered in correspondence with the British Meteorological Office.

Milk Production of Ayrshire Cattle.

THE critical genetic study of a character such as that of milk production in cattle, which is highly subject to environmental influences, cannot be carried out effectively until a fairly comprehensive knowledge of the normal variation of the character has been acquired. To this end Prof. Raymond Pearl and Mr. J. R. Miner have carried out a biometrical analysis of the normal individual variation in the milk flow and the fat content of the milk of Ayrshire cattle, the results of which are summarised in a contribution to the *Journal of Agricultural Research* (vol. xvii., No. 6). Their study is based on the records of Ayrshire cattle for the years 1908 and 1909 published in the reports of the Ayrshire Cattle Milk Records Committee of Scotland, more than three thousand records in each year being used for the purpose. Amongst the many important conclusions arrived at mention may be made of the indications that about one-half of the observed variation in milk-production results from the varying genotypic individuality of the animals with respect to this character, the remainder resulting from varying environmental influences. The udder as a secreting organ is compared with the oviduct of a hen, and it is shown that the latter operates with somewhat less variability than the former, having regard to the absolute weight of the product in the two cases.

The change in mean weekly yield of milk with advancing age is found to be represented by a logarithmic curve, the absolute amount of milk produced per unit of time increasing, though at a decreasing rate, with the age of the cow to a maximum, which was found to be when the cow is ten to eleven years old. The mean fat percentage of the milk was found to decline with advancing age until the tenth year of the cow's life, after which it remains about constant.

The Ignition Points of Liquid Fuels.

IN a paper read before the Institution of Petroleum Technologists on January 20, Mr. Harold Moore described a number of determinations of the ignition point of commercial fuels which are, or might be, used in internal-combustion engines. His ignition meter, somewhat similar in principle to that designed by Holm, consists of a steel block, heated from below, in the upper surface of which a hollow is made to take a crucible of platinum, nickel, or quartz. The air or oxygen supply passes through a hole in the block before entering the crucible, so as to pre-heat it to the temperature of the crucible, which is given by a resistance thermometer placed in a hole drilled in the block near the crucible. A cover to protect the crucible from draughts is screwed on to the block, and a drop of the liquid fuel is introduced through a hole in this cover and falls on to the bottom of the crucible. After an interval, more or less prolonged, an explosion is heard and a flame seen if the temperature is above the ignition point. This interval may be as long as thirty seconds or more, and there is no doubt that quiet combustion takes place during this period, and such combustion is very marked in the case of ether. On the other hand, the evaporation of the drops of liquid must produce local cooling, and, unless the fuel is quite homogeneous, the ignition point found must in many cases be that of the last portion to evaporate.

But, in spite of certain inherent defects, the method gives a valuable comparative test of different fuels—a test which is quick and easy to apply.

Mr. Moore recommends the use of ordinary compressed oxygen instead of air as giving more concordant results and as having a concentration at atmospheric pressures more nearly like that used in motor engines. Most hydrocarbon liquids tested in air gave ignition points from 100° C. to 200° C. higher than in oxygen; but, curiously enough, Mr. Moore found that in an atmosphere containing 70 per cent. of carbon dioxide and 30 per cent. of oxygen the ignition point of kerosene was almost the same as in pure oxygen. A few ignition points from Mr. Moore's lists may be quoted:

Ignition Point.

Fuel	In oxygen °C.	In air °C.
Taxibus spirit (Anglo-American Oil Co.)	272	396
Anglo-Persian oil	254	408
Anglo-Mexican oil	259	417
Normal hexane	287	—
Benzene	620	—
Ethyl alcohol	395	518
Ether (methylated)	190	347
		In silica crucible
Hydrogen	—	678

In the case of mixtures of two liquids of very different ignition points the addition of about 20 per cent. of the more easily inflammable liquid suffices to reduce the temperature substantially to that of the lower constituent; for instance, the addition of 20 per cent. of ether (ignition point 206°) to xylol (ignition point 555°) reduced the ignition point of the mixture to 246°

Naval Research and Experiment.

TO ensure that the full benefits of science shall be secured to the Naval Service, a Department of Scientific Research and Experiment has been set up under the Third Sea Lord and Controller. As the Scientific Adviser of the Admiralty, and in charge of this Department, Mr. F. E. Smith, F.R.S., has been appointed with the title of Director of Scientific Research. It is the duty of the Department to keep the Navy in touch with outside scientific establishments and to ensure that the work at the various naval experimental establishments proceeds with full cognisance of scientific progress and methods. The Director of Scientific Research will work in close association with the Naval Staff, thus ensuring that naval policy is framed with due consideration of the possible practical applications of scientific progress in relation to naval needs, and enabling requirements as to types and weapons to be formulated with a knowledge of the latest scientific possibilities.

Consultations with outside scientific institutions will be resorted to, both to ensure against overlapping and with the view of utilising such of their researches and experiments as appear likely to prove of value to the Naval Service.

At present there exists under the Department a naval research laboratory at Shandon. This establishment was set up during the war with the primary object of investigating methods of counteracting the enemy's submarine menace. It has performed, and is performing, good service; but Shandon is a great distance from the experimental schools, the various scientific institutions, and the Admiralty, and it has therefore been decided that, so soon as suitable accommodation can be provided elsewhere, such of the work as requires sea environment, together with the scientific *personnel* associated with it, will be removed to a suitable existing naval establishment, and the remainder, which does not in its early stages require a sea environment, will be transferred to a naval research institute. This institute, under the Director of Scientific Research, will adjoin the National Physical Laboratory at Teddington. It will be entirely controlled by the Admiralty, but its close association with the National Physical Laboratory will offer exceptional facilities for co-operation, and the staff of the research institute will have the advantage of personal acquaintance with the work being carried out at the laboratory. The Department of Scientific and Industrial Research will be consulted in all cases when the results of investigations are likely to be of use to the general community.

To ensure effective co-operation and contact with naval thought, naval officers will frequently visit the research institute, and the scientific staff will work for lengthy periods at naval establishments, and at times go to sea

Education and Science in the Civil Service Estimates for 1920–21.

THE Estimates for Civil Services for the year ending March 31, 1921 (Class IV.: Education, Science, and Art), have now been published. Among the increased grants compared with those of last year are:—Board of Education, 12,983,094*l.*; British Museum, 74,519*l.*; Scientific Investigation, etc., 81,442*l.*; Scientific and Industrial Research, 246,845*l.*; Public Education (Scotland), 2,200,000*l.*; Public Education (Ireland), 185,735*l.*; and Science and Art (Ireland), 20,917*l.* As the Geological Museum and Geological Survey are now under the Department of Scientific and Industrial Research, their grants of 7560*l.* and 30,043*l.* respectively represent part of the increase of 246,845*l.* to that Department. The grant for scholarships, exhibitions, and other allowances to students in technical schools and colleges is increased from 17,460*l.* to 34,350*l.* In addition, there are new grants of 15,000*l.* for scholarships tenable at universities, and expenses incidental to them, and 250,000*l.* to local education authorities for maintenance allowances at places of higher education. The total amount of the grants in aid of universities, colleges, medical schools, and like institutions in the United Kingdom is about 1,000,000*l.*; there is also a special grant of 196,000*l.* for extraordinary expenditure. The grant for assistance towards the higher education of ex-officers and men of like standing is 3,000,000*l.*, compared with 2,000,000*l.* for 1919–20. The grant under the Royal Society shows an increase of 9000*l.*, and includes 2000*l.* for subscriptions to international research associations. The subjoined summary and details are extracted from the Estimates:—

SYNOPSIS.

United Kingdom and England.

Board of Education	45,755,567
British Museum	294,233
National Gallery	29,956
National Portrait Gallery	9,824
Wallace Collection	15,953
London Museum	5,412
Imperial War Museum	50,000
Scientific Investigation, etc.	208,416
Scientific and Industrial Research ...	518,298
Universities and Colleges, United Kingdom, and Intermediate Education, Wales	945,700
Universities, etc., Special Grants ...	196,000
Serbian Relief Fund (maintenance and education of young Serbians in this country)	25,000

Scotland.

Public Education	6,877,220
National Galleries	11,661

Ireland.

Public Education	3,358,371
Intermediate Education	90,000
Endowed Schools Commissioners ...	1,042
National Gallery	4,650
Science and Art	211,415
Universities and Colleges	86,000
	58,694,718

DETAILS.

Scientific Investigation, etc.

	£	£
Royal Society:		
(i) Grant in aid of:—		
Scientific investigations undertaken with the sanction of a Committee appointed for the purpose (including non-recurrent grant of 5000*l.*) ...	11,000	
Scientific publications	1,000	
Subscriptions to international research associations ...	2,000	
		14,000
(ii) Grant in aid of salaries and other expenses of the Magnetic Observatory at Eskdalemuir		1,000
Total for Royal Society ...		15,000
Royal Geographical Society		1,250
Marine Biological Association of the United Kingdom		1,000
Royal Society of Edinburgh		600
Scottish Meteorological Society		100
Royal Irish Academy		1,600
Royal Irish Academy of Music		300
Royal Zoological Society of Ireland ...		500
Royal Hibernian Academy		300
British School at Athens		500
British School at Rome		500
Royal Scottish Geographical Society ...		200
National Library of Wales		12,000
National Museum of Wales		25,500
Solar Physics Observatory		3,000
North Sea Fisheries Investigation ...		1,250
Imperial Mineral Resources Bureau ...		10,750