

tremors propagated in the soil, and quickly afterwards to movements produced by air waves acting on the building, and then to the instrument. A second paper, by the late Dr. M. Contarini, is on the choice of earthquake recorders. Although the paper is short it contains good advice. We are told first to select our instrument according to the object we may have in view. If we wish to record earthquakes of local origin, a type of instrument may be used different to that which will record disturbances with their origins as distant as the antipodes. Again, an instrument which may record the times of arrival of certain phases of motion may not be able to analyse the same; in fact, for earthquakes of distant origin it is doubtful whether an instrument yet exists that gives a true record of the movements of the soil.

At the end of the number the Italian catalogue of shocks of local and of distant origin is brought up to the end of September, 1902.

In an interesting article of twenty-eight pages, M. Paul Choffat gives in *Communications du Servia Geologique du Portugal* (Tome v., pp. 279-306) an account of "Les tremblements de terre de 1903 en Portugal," to which he adds notes relating to earthquakes which took place in previous years. From the conclusions we learn that there are two chief centres from which disturbances felt in Portugal originate, one of which is suboceanic off the mouth of the Tagus, from which the great Lisbon earthquake of 1755 radiated, and the other is in Andalusia, the shocks from which are comparatively feeble. There are also several local centres.

#### AGRICULTURAL NOTES.

THE officials in charge of the County Technical Laboratories at Chelmsford are engaged in an investigation that will commend itself to Londoners; they are trying to gain some information as to the natural causes bringing about variation in the composition of milk. Two reports dealing respectively with the winter and summer months of the past year have been issued. From the latter we learn that in Essex milk is poorest in the months of July and August. This is the common experience of dairy farmers. It is when the pastures begin to dry up that the quality of milk suffers most. In the Essex experiments four cows were kept under observation from May until September, and two others for a shorter period. The yield of milk fell off at the rapid rate of 10 per cent. per month; with this decline there was an increase in the proportion of fat, but no regular increase in the case of solids not fat. In the month of July the percentage of non-fatty solids decreased in the milk of every animal. The milk of four of the cows, and the mixed milk of the six animals, never fell below the standard in solids not fat, but two of the cows often failed in this respect. The mixed milk and the milk of one of the cows never contained less than the standard quantity of fat, but the milk of two of the cows frequently, and the milk of two others occasionally, contained less than the required 3 per cent. of fat.

In connection with the investigations on nutrition, which form an important part of the work of the Storrs Agricultural Experiment Station, Conn., analyses have recently been made of the flesh of many kinds of fowl. The analyses were published in the annual report of the station for 1902-3, and some account of them is also given in a recently issued bulletin on "Poultry as Food." The bulletin contains a table showing the composition of the digestible nutrients in the flesh of poultry; comparisons are made between young and mature birds, and also between poultry and other common articles of diet. The meat of light-fleshed birds is shown to be usually richer in albuminoids and poorer in fat than the meat of dark-fleshed; and among light-fleshed fowls chickens supply a more nitrogenous food than mature birds; on the other hand, in dark-fleshed fowls the flesh of the young appears to contain more fat and less albuminoids than the flesh of older birds. The following figures show that the breast, or breast and wings of poultry, usually contain more albuminoids and less fat than the legs or dark meat. The analyses were of raw meat. Cooking may materially alter the proportion of fat.

	Digestible nutrients	
	Albuminoids	Fat
	Per cent.	Per cent.
Chicken, light meat ... ..	21·2	7·0
„ dark „ ... ..	20·2	7·8
Turkey, light meat ... ..	25·0	10·7
„ dark „ ... ..	19·4	23·8
Duck, breast ... ..	21·6	2·2
„ other parts ... ..	16·9	24·8

An important paper containing a summary of Koch's investigation of Rhodesian red-water, or, as he prefers to call it, African coast fever, appears in the May number of the *Agricultural Journal* of the Cape of Good Hope. This disease of cattle, introduced from the coast, has recently worked havoc in Rhodesia, the mortality among the herds of certain districts having risen to 90 per cent. Like Texas fever, with which it was at first confounded, coast fever is due to the presence of a tick-conveyed parasite in the blood. An animal which has recovered becomes immune, and, according to Koch, a proportion of the progeny contract the disease in a mild form as calves and also become immune, so that an immune race will gradually form in the same way as a partially immune population is to be found in many of the most deadly malaria districts. In the absence of ticks, coast fever cannot spread. Unlike Texas fever, injection of the blood of a diseased animal will not produce the disease. But Koch has shown that repeated injections result in a mild fever which is sufficient to confer partial, and in his opinion a high degree of immunity. On this fact is based the treatment which he recommends for the disease, the injection of 5 c.c. of defibrinated blood from a sick or "salted" animal about seven times at intervals of a fortnight. This treatment he believes will in four or five months confer immunity. Inoculation is absolutely safe, for of 3115 "clean" animals treated not one died, and the treatment is so rapid that an operator can deal with 300 to 500 per day. Of the efficacy of the treatment it is clear that Koch has a high opinion, though he is careful to point out that his experimental evidence is not yet complete. Of 1688 animals that had been exposed to infection and were inoculated, 174 died. As in many of these cases inoculation must have been too late to benefit, Koch argues that the number dying because inoculation failed to protect must have been very small. In view of the very high death rate in unprotected herds it would appear that the proposed treatment is of high promise.

But Koch's views on the value of inoculation do not seem to be shared by all the experts who are now engaged in the study of African coast fever, and the Government entomologist, Mr. Lounsbury, who has made a careful study of the tick conveying the disease, appears to favour the use of arsenical dips, which, by destroying the tick, would put an end to the ravages of coast fever. Lounsbury speaks of these dips as an "effectual remedy," while Koch characterises their use as a "temporary" measure. Mr. Lounsbury publishes an interesting account of the experiments by which he proved that the infection was carried by the common brown cattle tick of South Africa (*Rhipicephalus appendiculatus*). He failed in ten experiments to convey it through the blue tick, which Koch says is partly responsible for transmission. In a preliminary experiment Lounsbury proved that brown ticks taken from sick cattle in Rhodesia produced coast fever in Cape Colony. Brown ticks were then collected in a region in the colony in which coast fever was unknown. From these ticks progeny were raised, the majority of which were fed throughout life on healthy cattle without causing any disturbance in health; others were taken to Rhodesia and placed on a sick cow; they were then taken back to Cape Colony and put, at intervals of a few days, on three cattle. "The results were most decisive. The three animals sickened each in turn about a fortnight after the infestation," and all died. This experiment was repeated, and it was found that a single tick could produce the disease. Lounsbury notes that one of the cattle which died in his experiments had previously been inoculated ten times from an animal pronounced by Koch to be suitable as a "bleeder."

While in South Africa Koch has studied horse-sickness, and in a recent report on his work he speaks of "encouraging results which . . . impress me with the conviction that a practical method of protective inoculation against Horse-sickness is within our reach." A serum has been prepared which has slight curative but high protective properties. Unfortunately, the immunity conferred by the serum lasts only for some fifteen days, so that a horse cannot be "salted" by inoculation, and to be safe from an attack the animal must have already had horse-sickness in some form. The "practical method" which Koch proposes consists in producing horse-sickness by an injection of virus, and then arresting its progress by injections of the protective serum before it becomes dangerous. The method has been practised successfully on more than a dozen animals. As the result of his experiments Koch recommends the following treatment:—Seven injections of virus at intervals of twelve days, the doses increasing from 0.01 c.c. to 5 c.c. Four days after each of the first three injections of virus, doses of 100 c.c., 50 c.c., and 50 c.c. of protective serum to be given. The injections of both virus and serum are made subcutaneously in the neck.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Frank Smart studentship in botany has been awarded to Mr. A. M. Smith, of Emmanuel College.

Mr. E. R. Burdon, of Sidney Sussex College, has been appointed assistant curator of the botanical museum.

Science announces the resignation of Prof. G. Trumbull Ladd as head of the department of mental philosophy and metaphysics of Yale University.

LORD STRATHCONA has given 4000*l.* to the scientific department of the Manitoba University. A block of land sufficient to yield a large annual income is also to be placed at the university's disposal.

THE chair of chemistry in University College, Sheffield, has been accepted by Dr. W. P. Wynne, F.R.S., at present professor of chemistry in the School of Pharmacy of the Pharmaceutical Society of Great Britain.

DR. C. SCHUCHERT, of the U.S. National Museum, has been appointed professor of historical geology in the Sheffield Scientific School of Yale University, and curator of the geological collections in succession to the late Prof. Beecher.

THE "Year-book" for the session 1904-5 of the Armour Institute of Technology, Chicago, a copy of which has reached us, contains full particulars of the course in fire protection engineering instituted last year. The course is arranged to furnish instruction in modern methods of fire prevention and extinction. Since fire insurance interests are closely connected with the work of the course, a portion of the time of senior students is devoted to the study of modern practice of fire underwriting. Prof. Taylor, who is in charge of this department of the institute, has rightly given great prominence in his syllabus to the scientific principles upon which successful work in fire extinction depends.

THE consultative committee to the Board of Education has submitted a number of suggestions to the board for a system of school certificates. The committee is of opinion that, with the object of diminishing the multiplicity of examinations affecting secondary schools, and of providing a test of adequate general education which may be widely accepted, a general system of school certificates is desirable. The committee does not think it is desirable that examinations for such certificates should be conducted by means of papers set for the whole country from a single central organisation. It suggests that such examinations should be controlled by a recognised examining body, which should be either a university or a combination of universities, or an examination board representative of a university or universities, and of the local authorities which are prepared to cooperate with them. It proposes that recognition of these examining bodies should mean recognition by the Board of Education, acting on the advice of the consultative committee. The establishment is

suggested of a central board for England consisting of representatives from the Board of Education and from the different examining bodies, the duty of which should be to coordinate and control the standards of these examinations, to secure the interchangeability of certificates, and to consider and, as far as possible, to adjust the relations of the examining bodies and their spheres of external action. There can be little doubt that some such plan as the consultative committee proposes would enable schoolmasters to utilise in the better education of their boys much of the time now absorbed by the preparation for numerous special examinations.

### SOCIETIES AND ACADEMIES.

PARIS.

**Academy of Sciences, July 11.**—M. Mascart in the chair.—Thermochemical investigation of the solution and polymerisation of cyanogen: M. Berthelot. Potassium cyanide has considerable thermal effect on a solution of cyanogen whether in water or alcohol.—Note on the heat of transformation of black crystalline sulphide of antimony into the orange coloured precipitate: M. Berthelot.—Condensation of glycol bromoacetate with acetoacetic and acetone dicarboxylic esters: A. Haller and F. March.—Origin in food of the arsenic normally found in man: Armand Gautier and P. Clausmann. Practically all food materials, particularly fish, contain traces of arsenic, the total arsenic received by an average man in a year being 7.66 mg.—The relation between external work and total expenditure of energy in a muscle in dynamic contraction, when the muscle is doing negative work, against the fall of a load, by gradually elongating as the load falls: A. Chauveau. It is concluded that the expenditure of energy is greater in negative work than in fixed contraction, but less than in positive work under the same conditions of load, stimulus, &c., and that in negative work the expenditure of energy increases more rapidly, when the work is increased by increase of load, than by increase of movement.—Note on a new method of observing *n*-rays: R. Blondlot.—Analysis of the ashes contained in the urns of Materpa (Thebes, eighteenth dynasty): MM. Lortet and Hugoumenq.—Regulation of watches at sea by wireless telegraphy: J. A. Normand.—The academy appointed MM. Mascart, Troost, Moissan, Guyon, and Lacroix to assist at the inauguration of the Pasteur monument in Paris.—Two problems on isothermic surfaces: L. Raffy.—Explosion waves: E. Jonguet.—Kathode rays and magnetofriction; reply to Villard: H. Pellat.—Note on the refractive indices of solutions: Edmond Van Aubel.—The relation between the pressure of a gas in a vacuum tube and the length of the spark produced: Gaston Séguéy. As the pressure decreases in geometric progression the length of the spark increases in arithmetic progression.—The densities of sulphurous anhydride and of oxygen: Adrien Jaquero and Alexandre Pintza. Morley's method of weighing the gas by the loss in weight of the generating apparatus was used with concordant results in the case of sulphurous anhydride.—The heat of combustion of organic sulphur compounds, and a note on that of compounds containing halogens: P. Lemoult. Results of experiments are compared with those obtained by calculation according to the position of the sulphur.—Reactions of the esters of 2:3-butanonic acid. (1) Action of phenyl hydrazine: L. Bouveault and A. Wahl. The phenyl hydrazone obtained in the cold is proved to be that in the 2-position by the formation of the paranitrophenyl hydrazone of methyl phenyl acetopyrazolone previously obtained by Bülow.—Researches in the pyrene series: E. Blaise and H. Gault.—On some phenolic ethers of the pseudo allyl chain  $R-C(CH_3)=CH_2$ : MM. Behal and Tiffeneau. These bodies are obtained by the magnesium methiodide reaction on the corresponding esters, using one or two molecules in excess of the magnesium methiodide, and are intermediate between the corresponding allyl and isoallyl compounds in boiling point, density, and refractive index.—Action of traces of some salts, and of caustic alkalis on diphenyl carbonic ester: R. Fosse.—Mechanism of the action of the cytoplasm in seeds during germination, and the synthetic realisation of this mechanism *in vitro*: Maurice Nicloux. The development of acid in oily seeds, when