was not re-ignited; the bulk of the nitrogen was nearly five minutes in boiling off, after which a smouldering splinter dipped into the mouth of the test-tube burst into flame.

Between the poles of the magnet all the liquefied air went to the poles; there was no separation of the oxygen and nitrogen. Liquid air has the same high insulating power as liquid oxygen. The phenomena presented by liquefied gases present an unlimited field for investigation. At − 200° C. the molecules of oxygen had only one-half of their ordinary velocity, and had lost three-fourths of their energy. At such low temperatures they seemed to be drawing near what might be called "the death of matter," so far as chemical action was concerned; liquid oxygen, for instance, had no action upon a piece of phosphorus and potassium or sodium dropped into it; and once he thought, and publicly stated, that at such temperatures all chemical action ceased. That statement required some qualification, because a photographic plate placed in liquid oxygen could be acted upon by radiant energy, and at a temperature of − 200° C. was still sensitive to light.

Prof. M'Kendrick had tried the effect of these low temperatures upon the spores of microbic organisms, by submitting in sealed glass tubes blood, milk, flesh, and such-like substances, for one hour to a temperature of − 182° C., and subsequently keeping them at blood heat for some days. The tubes on being opened were all putrid. Seeds also withstood the action of a similar amount of cold. He thought, therefore, that this experiment had proved the possibility of Lord Kelvin's suggestion, that life might have been brought to the newly-cooled earth upon a seed-bearing meteorite.

In concluding, the lecturer heartily thanked his two assistants, Mr. R. N. Lennox and Mr. J. W. Heath, for the arduous work they had had in preparing such elaborate demonstrations.

SCIENTIFIC SERIALS.

IN the *Journal of the Royal Agricultural Society of England* (third series, vol. iv. pt. 1) there is an interesting paper on the home produce, imports, consumption, and price of wheat over forty harvest years, 1852-3 to 1891-2, by Sir J. B. Lawes and Dr. J. H. Gilbert. This paper, extending to fifty-five pages, contains a general review of the produce of the experimental plots at Rothamsted, from which they have annually calculated the wheat crop of this country.—The first of the official reports is that of the Royal Veterinary College on investigations conducted for the Royal Agricultural Society during the year 1892. An interesting case of actinomycosis is related; a heifer with tongue badly diseased was put under Thomassen's treatment. Potassium iodide administered at first in doses of one drachm, twice daily, and the doses gradually increased to three drachms, effected a complete cure in about ten weeks.—Experiments have lately been made at the Veterinary College with Koch's tuberculin. The results in the case of seventy-two animals inoculated and afterwards killed show that "the tuberculin pointed out correctly the existence of tuberculosis in twenty-seven animals and wrongly in five, and it failed to indicate the existence of the disease in nineteen. In only three of the twenty-seven animals in which the tuberculin correctly pointed out the existence of tuberculosis could a positive diagnosis have been made by any other means." Experiments have also been made with Kalning's mallein, and "the results warrant the statement that mallein is an agent of greater precision than tuberculin, and that it is likely to render most important service in any attempt to stamp out glanders."

Wiedemann's Annalen der Physik und Chemie, No 4.—On electric discharges; the production of electric oscillations, and their relations to discharge tubes, by H. Ebert and E. Wiedemann. The influence of electric oscillations of given frequency in producing glow in vacuum tubes without electrodes was investigated by means of Lecher's wire system. The oscillations in the primary circuit were produced by means of an influence machine throughout. The terminals of the machine were connected to the primary condenser, consisting of four plates, to the further two of which the two Lecher wires, copper wires or thick metal tubes, were attached, running parallel for distances varying from 2 to 14 m., and ending in another condenser of variable capacity. The sensitive tubes were placed in various positions between or near the plates of the secondary condenser. It was found that wide tubes, not too short, glowed most readily. Nodes along the wires were discovered by means of wire bridges, which were moved along the wires until the tube glowed, or, if it was glowing already, until it reached a point where the glow became more intense and uniform. It was found that the position of the nodes was independent of the pressure in the tube, but that as evacuation proceeded the limits within which the tube would glow grew wider. Hence the most accurate method for finding the nodes, was by finding them for the highest possible pressure of gas in the tube.—On the comparison of intensities of light, by the photoelectric method, by J. Elster and H. Geitel. Apart from the dissipation of an electric charge from a negative zinc pole by ultra-violet radiation, it is also possible to measure the intensity of optically active light by an electric method. If a clean surface of potassium is joined to the negative pole of a battery, and a platinum or aluminium electrode to the positive pole, and the two electrodes are placed in a vacuum cell, the illumination of the potassium surface will allow a current to flow whose strength will be proportional to the intensity of the light source, and can be measured by means of a galvanometer. That this is really the case was proved by measuring independently in this way the intensities of two luminous sources, and then combining them, when the resultant reading was found to be equal to the sum of the other two, within the limits of constancy of the sources themselves. The greatest effect is produced by the blue rays.—Also papers by Messrs. Bjerknes, Zahn, Voigt, Richarz, Ambronn, Christiansen, Goldhammer, and Oberbeck.

Meteorologische Zeitschrift, March.—Iridescent clouds, by H. Mohn.—The paper contains observations made at Christiania during the years 1871-1892, together with a detailed investigation of the formulæ recently employed. During this period iridescent clouds were only visible on forty-two days; in some years the phenomenon failed entirely, and was not observed during the whole lustrum 1876-80. The great majority of cases occurred in December and January, but a few occurred in summer; the phenomenon was also seen somewhat more frequently at sunset than at sunrise or mid-day, but the difference is so small as to make it appear that its occurrence is independent of the time of day. The height of the clouds varied from about fourteen to more than eighty miles, the lower level being about twice the height at which ordinary cirrus clouds are usually seen at Christiania. The phenomenon appears to have some connection with the state of the weather, as an examination of the synoptic charts showed that it mostly occurred during the prevalence of stormy weather in the North Atlantic and over Northern Europe, and when the air was dry and warm at Christiania.—On the determination of wind force during gusts of a Bora storm, by E. Mazelle. From an investigation of the anemometer observations at Trieste for the ten years 1882-1891, the greatest hourly velocity recorded was seventy miles. But as hourly values give little idea of the violence of individual gusts, the author adapted an ingenious electrical arrangement to the anemometer, by which he could record the number of revolutions of the cups in each second. During a storm on January 16 last, the gusts during the space of a few seconds reached the velocity equivalent to 100 to 140 miles an hour. Presuming the instrument to have been a large-sized anemometer, this high velocity is not unlikely, as in a paper read before the Royal Meteorological Society on May 18, 1881, by R. H. Curtis, a velocity at the rate of 120 miles an hour at Aberdeen is quoted as recorded in gusts lasting two minutes, while shorter intervals, if they could be measured, would no doubt show higher velocities; and at Sydney a velocity of 153 miles an hour was recorded during one or two minutes. In all these cases the factor 3 has been used for the ratio of the movement of the cups to that of the wind, but this factor has been shown to give a velocity which is nearly 30 per cent. too high.

Bulletin de la Société des Naturalistes de Moscou, 1892.—(No. 1.) The chief papers are:—The development of the gemmulæ in *Ephydatia fluviatilis*, by W. Zykoff.—Catalogue of Kazan Lepidoptera, continued, by L. Kroulikovsky.—Analogy between the solution of a gas and of a salt in indifferent solutions of salts, by I. M. Syetchenoff. The author's law, which was found for carbon dioxide $\left(y = \alpha e - \frac{k}{x}\right)$, holds good within certain limits, for the solution of salts in the same solutions; but the latter must only be taken either weak or of medium strength.—New plants and insects from Sarepta, by Alex. Becker.—On a

mesozoic fish from the Altai, by J. V. Rohon (*Lepidotus altaicus*, n. sp.).—On the cells of some conjugata devoid of nucleus, by J. Gerasimoff.—(No. 2.) The Rhinoceridæ of Russia, and the development of Rhinoceridæ, by Marie Pawloff. —Researches relating to some Protococcoidæ, by Al. Artari (in German). The work has been done chiefly in order to study the doubtful species. They were cultivated in different conditions, and proved to be independent species. At the same time the author experimented upon the influence of various media upon variations; the latter proved to occur within certain well-defined limits only, not exceeding the specific differences. The Algæ, when returned to their previous conditions, may return to their previous forms, thus proving a certain resistance of the organism against the medium. The following new species are described:—*Gloeocystia nægeliana*, *Pleurococcus simplex*, *P. conglomeratus*, *P. regularis*, *P. Beyerinckii*, and *Chlamydomonas apiocystiformis* (three plates).—The birds of the Government of Moscow, by Th. Lorenz, with preface by Prof. Menzbier (first paper). Eighty-eight species are mentioned, with remarks upon their manners of life, based upon many years' observations.

Zapiski (Memoirs) of the Novoros Sian (Odessa) Society of Naturalists, vol. xvii. 2.—N. Andrussoff contributes, under the name of bio-geographical notes, a paper on pelagic diatoms, which contains a list of all named species of diatoms which have hitherto been found, either free, or in the stomachs of pelagic animals, both near to the coasts and in the open sea. The list is based on the researches of Hooker, Ehrenberg, Baddeley, Grunow, Castracane, and so on, down to the *Challenger* expedition, and the works of Murray, Hensen, and Brun, and it is followed by short remarks upon the geological importance of diatoms. The paper is summed up in German. —Prof. Sintsoff gives a list of Neogene fossils in Bessarabia, the following species being new:—*Acmæa* (*Scurria*) *Reussi*, *tennissima*, *subrostata*, and *striato-costata*, *Acmæa pseudo-lævigata*, and *Buccinum subspinosum*.—D. Zabolotny discusses animal phosphorescence, and gives some facts on the same phenomenon observed in *limans*, near Odessa. The phosphorescent water was of a brown red colour, and contained masses of Daphniæ, Rotifers, and Infusoriæ. It appeared that luminosity was due to one Cilioflagellate, *Glenodinium*, from the *Peridinidæ* tribe, and it seems that light was emitted by the protoplasm itself of the little animal.—A. Lebedintseff describes the bathometer used in 1891 and 1892 during the explorations of the Black Sea; and G. Muskatblüth gives a note on mitotic division of leucocytes in circulating blood.

Annalen des K. K. Naturhistorischen Hofmuseums, viii. No. 1. (Wien, 1893.)—Dr. O. Finsch continues his "Ethnological experiences and authenticated objects from the South Sea." The present is the first paper on Micronesia, and deals with the Gilbert Islands. As is usual with Dr. Finsch's papers, it is well illustrated by eight plates, two of which are in colours, containing 110 figures, besides 16 wood-cuts. Although this paper, like the others of the series, is a catalogue of the objects collected by Dr. Finsch, and now in the National Museum in Vienna, it is at the same time an important contribution to the ethnography of Micronesia, a region of the great ocean about which comparatively little is known. The Gilbert Archipelago—often called the Kingsmill Islands—are best known to the frequenters of museums as the country of formidable weapons armed with serried rows of sharks' teeth, and of the coir armour which was worn as a defence against these deadly weapons. Dr. Finsch is of opinion that the Gilbert Archipelago, with Banaba and Nawodo, constitute a well-marked sub-province, as there is a distinct language, peculiar pantomimic dances (in which both sexes participate), characteristic tattooing, a special style of house, which latter are grouped into large villages, colossal assembly houses, well-built canoes, even for the South Sea, shark-tooth weapons, armour, a noose for catching eels, &c. He concludes by saying, "In every respect the Gilberts exhibit more affinity with Melanesia than with Polynesia, and least of all with Micronesia." The other articles are: "Characterless birds' eggs: an oological study" [on *Corvus corone*, *C. cornix* and *C. frugilegus*], by Emil C. F. Rzehak; "On the crystalline structure of meteoric iron," by G. Linck, and the usual official reports for 1892.

THE last three numbers received (2–4) of the *Bullettino della Società Botanica Italiana* contain a very large number of papers on the flora, phanerogamic and cryptogamic, of various districts of Italy and the adjacent countries, including an interesting note on the very rich flora of Monte Nerone. In addition to these Prof. R. F. Solla describes a case of polyembryony in the carob, *Ceratonia siliqua*, and also the structure of the tanniferous cells in the same plant. Sig. E. Baroni has a note on the relationship of calcicolous lichens to their substratum. Dr. C. Massalongo describes a gall on the bay, *Laurus nobilis*, due to the attacks of an insect which he regards as a new species, and names *Phytoptus Malpighianus*. Prof. G. Arcangeli gives the result of observations on the growth of the leaf-stalk of various species of Nymphæaceæ, which he finds to be greater in the case of immersed than of floating leaves. This he attributes to the vertical pressure of the water on the upper surface of the leaves in the former case. A paper by the late Prof. F. Pasquale was read, describing a fall of rain from lime-trees, quite unconnected with the manna produced by aphides, and due to the inability of transpiration to eliminate the whole of the water absorbed through the roots.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 23.—"Preliminary Notice on the Arrow-Poison of the WaNyika and other Tribes of East Equatorial Africa, with special reference to the Chemical Properties and Pharmacological Action of the Wood from which it is prepared." By Thomas R. Fraser, M.D., F.R.S., Professor of Materia Medica in the University of Edinburgh, and Joseph Tillie, M.D. (Edin.)

Burton,[1] Cameron,[2] and other travellers have given accounts of much interest of an arrow-poison used in warfare and in the chase by the WaNyika, WaKamba, WaGyriama, and other tribes of Eastern Equatorial Africa.

Several years ago, an opportunity was given to one of the authors to examine poisoned arrows, and the poison used in smearing them, of the WaNyika tribe. While the pharmacological action of this poison was found to have a close resemblance to that of *Strophanthus* seeds, its physical and chemical properties enabled the conclusions to be drawn that the poison was not made from these seeds, but was chiefly composed of an extract prepared from a wood.[3]

These conclusions have been confirmed by the examination of further specimens of the WaNyika arrow-poison, and of the wood from which it is prepared; and some of the results of this examination are stated in this paper.

The authors have separated from the arrow-poison and from the wood a crystalline glucoside, whose elementary composition, reactions and other characters they describe.

They have elaborately investigated the pharmacological action of this glucoside. The minimum-lethal dose for frogs was found to be about 0·00005 grain per 100 grains of weight of frog, and for rabbits about 0·000035 grain per pound of weight of animal.

The glucoside has a very pronounced action upon the heart. A large dose causes, in the frog, arrest of the contractions in a state of ventricular systole, and the heart soon afterwards acquires an acid reaction. After the heart is paralysed, respiration may continue for so long as an hour, and for a considerable time the frog can jump about actively. Smaller doses, on the other hand, slow the heart by prolonging diastole, and arrest its pulsations in a state of ventricular diastole. This diastolic arrest is not prevented by the administration of atropine, and is probably due to a direct action on the motor ganglia and muscle of the heart. The action on blood vessels is very slight. Transfusion experiments in the frog with a solution of 1 in 10,000 of saline produced only about the same effect as the pure saline solution alone.

A marked paralysing action is exerted upon the skeletal muscles, which also quickly pass into a condition of *rigor mortis*. The spinal cord and sensory and motor nerves are but little affected, and the former only doubtfully, except indirectly through the enfeebled circulation when large doses are administered. In warm-blooded animals, artificial respiration does not prevent death from cardiac failure.

In blood-pressure experiments, non-lethal doses were found to produce a remarkable slowing of the pulse, the vertical height of each pulse-curve indicating, at the same time, a great increase in the force of the ventricular contractions.

1 "The Lake Regions of Central Africa," 1860, vol. 2, p. 305.
2 "Across Africa", 1885, p. 59.
3 Fraser, "On *Strophanthus hispidus*: its Natural History, Chemistry, and Pharmacology," "Edinburgh Roy. Soc. Trans.," vol. 35, Part IV, 1890, pp. 966-67.