

flasks from which all air has been expelled. The evidence in our possession is therefore most complete on this part of the subject: it shows beyond all doubt, not only that putrefaction may and does very frequently occur under conditions in which the advent of atmospheric particles, whether living or dead, is no longer possible, but also that living particles, derived from the atmosphere can only be very rare and altogether exceptional initiators of the putrefaction which invariably occurs in previously boiled infusions exposed to the air.

Again, the evidence which we now possess with reference to the influence of heat upon *Bacteria*, *Vibriones*, and their supposed germs is no less decisive. It has been unmistakably proved that such organisms and their imaginary germs are either actually or potentially killed by a brief exposure to the temperature of 140° F. when in the moist state; and it had also been previously established that they are invariably killed by desiccation even at much lower temperatures.*

But if living germs do not come from the air to contaminate the previously boiled fluids, and if it is not possible for any of them to have escaped the destructive influence of heat in the boiling fluid or on the walls of the vessel in which the fluid is contained, what can be the mode of origin of the swarms of living things which so rapidly and invariably appear in such infusions when contained in open flasks, and which so frequently appear when the infusions are contained in flasks whose necks are closed against atmospheric particles of all kinds? They can only have arisen by the process which I have termed Archebiosis.

CONCLUSIONS

If a previously boiled ammoniac-tartrate solution remains free from *Bacteria* and *Vibriones* when exposed to the air, it is because the air does not contain living organisms of this kind or their supposed germs, and because mere dead organic particles are not capable of initiating putrefaction in such a fluid.

And if ordinary organic infusions previously boiled and exposed to the air do rapidly putrefy, though some of the same infusions when exposed only to filtered air remain pure, it is because such fluids are, in the absence of living units, quite amenable to the influence of the dead organic particles which the air so abundantly contains, although they are not self-fermentable.

Whilst if other more changeable fluids, after previous boiling, when exposed to filtered air or cut off altogether from contact with air, do nevertheless undergo putrefaction or fermentation, it is because these fluids are self-fermentable, and need neither living units nor dead organic particles to initiate those putrefactive or fermentative changes which lead to the evolution of living organisms.

SCIENTIFIC SERIALS

THE June number of the *Journal of Anatomy and Physiology* contains several papers of special interest, as well as the excellent summaries by Profs. Turner and Rutherford, of the progress of Anatomy and Physiology during the last six months. Prof. Turner describes, for the first time, the Visceral Anatomy of the Greenland Shark (*Lemargus borealis*) from two specimens caught near the Bell Rock. The larger was 11 feet 8 inches long, and the other 8½ feet: they were both females. The most important peculiarities of this fish, wherein it differs from other sharks are, that the *bursa entiana* is not developed; that there are two large duodenal cæca, one of which is closely adherent to the pyloric tube, as well as a true pancreas, corresponding with the similar condition found by Alessandrini in the Sturgeon; and that there are no oviducts, so that the ova must be discharged into the peritoneal cavity. From these peculiarities the author places *Lemargus* in a family by itself, named by him *Lemargidae*.—Prof. Turner also, in a short paper on the so-called claw at the end of the tail of the lion, shows that no true claw exists, but that the tip of the tail is hairless, and becomes

* See the experiments and conclusions of Dr. Burdon Sanderson in Thirtieth Report of Med. Officer of Privy Council, p. 61. This fact of the inability of these organisms and their germs to resist desiccation shows the futility of some objections which have been from time to time raised by those who thought that *Bacteria*, *Vibriones*, and their germs might resist the destructive influence of heat by adhesion to the glass above the level of the fluid, or even in the fluid itself, just as dried and very thick-coated seeds have been known to do. Dry heat would seem to be even more fatal to such organisms and their germs than a moist heat of the same degree, owing to their extreme inability to resist desiccation; if they become dry they are killed at a temperature of 104° F., whilst if they remain moist they succumb, as we have seen, to a temperature of 140° F.

hard on drying.—Prof. Rutherford tabulates experiments proving that the retardation of the pulse in the rabbit, which follows closure of the nostrils, depends on the obstruction of the respiration, and not as Drs. Brown-Séquard and Sanderson supposed, on direct reflex action. Mr. Dewar and Dr. McKendrick describe experiments on the Physiological Action of Light, an account of which has already appeared in this journal.—Mr. Blake, of San Francisco, has a paper on the action of the salts of the metals sodium, lithium, cesium, &c., when introduced directly into the blood. Mr. A. H. Smee, in a paper on the physical nature of the coagulation of the blood, endeavours to prove that it coagulates in obedience to a purely physical law, namely, the power of soluble colloid matter to pectinise, or spontaneously to coagulate. Mr. Garrod, on the law which regulates the frequency of the pulse, proposes as a substitute for that given by Marey, the following:—the heart re-commences to beat when the arterial tension has fallen an invariable proportion, this being the only possible explanation of the facts that pulse rate varies with arterial resistance and not with blood pressure. He also gives a new theory of the source of nerve force.—Dr. Charles, Prof. Curzon, and Prof. Drachmann, record peculiarities in anthropotomy, the first in the arterial system, the second in the muscular and nervous system, and the third in the muscular.—There is an excellent and very careful review, by Mr. Trotter, of the Rev. Samuel Haughton's "Principles of Animal Mechanics," which will be very valuable to many physiologists, who here have the opportunity of seeing the opinion of a mathematician, who is also a biologist, of a work which might by itself lead them to think that the physiological basis for work was in a better position than it really is.

Bulletin Mensuel de la Société d'Acclimatation de Paris for June. A great portion is devoted to the description of the best modes of rearing silkworms and the more suitable kinds of food for feeding them. A paper is devoted to the Japanese Mulberry (*Morus japonica*), which is being introduced into France as producing a superior food for the silkworm.—The cultivation of various kinds of beans and melons is advocated by M. Bossin, and his paper might be read with advantage in this country, where these vegetables are not sufficiently valued as an article of diet. Not only the acclimatisation of useful, but the destruction of hurtful animals, plants, and insects, forms part of the programme of the society, and we have therefore some remarks on insecticides and on the preservation of insectivorous birds.—The American notes on pisciculture, on the grey wolf, and the commerce of Chicago are interesting. A black monkey from Sumatra has just arrived at the Jardin d'Acclimatation, but it is not expected to live.

SOCIETIES AND ACADEMIES

LONDON

Quekett Microscopical Club, July 25.—Dr. Braithwaite, F.L.S., president, in the chair.—This being the annual meeting, the report of the committee for the past year was read, and testified to the continued prosperity of the club, which now numbers 570 members.—The president delivered the annual address, in the course of which he noticed the progress of microscopical investigation in Botany and Zoology during the past year.—The ballot then took place for the election of officers. Dr. Braithwaite was re-elected president; Dr. Matthews, Messrs. B. T. Lowne, T. W. Burr, and C. F. White, vice-presidents; and Messrs. Bywater, Crisp, Hailes, Hind, Waller, and T. C. White, were elected to fill the six vacancies on the committee. Mr. J. E. Ingpen succeeded Mr. T. C. White, who retires from the office of hon. sec. (owing to increase of his professional duties), after four years of unremitting and valuable service. The proceedings terminated with the usual *conversazione*.

BELGIUM

Royal Academy of Sciences, May 13.—Reports were given in on the following papers:—On the Superficial Tension of Liquids considered in reference to certain movements observed on their surface, by M. G. Van der Mensbrugghe, which it was resolved to print in the *Memoirs*.—On the Osculatory Sphere, a note by M. L. Saltel, which is printed in the *Bulletin*.—On the chloric acetonitriles, by M. L. Bisschopinck, also printed in the *Bulletin*.—Essay on the state of vegetation at the

epoch of the Heersien Marls of Gelinden, by Count G. de Saporta and Dr. A. F. Marion. It was resolved to print this paper with the plates in the *Memoires*.—The following communications were made:—On frozen alcoholic drinks carried to very low temperatures, and on the cooling and freezing of ordinary or sparkling wines, which will appear in the *Bulletin* for June.—Third addition to the synopsis of the Caloptergines, by M. de Selys Longchamps. His first list was published in 1853, and additions in 1859 and 1869; the present long list contains descriptions of many new species, as well as corrections of and additions to species already described. The author is indebted for the greater part of his material to Mr. MacLachlan.

PHILADELPHIA

Academy of Natural Sciences, May 6.—Dr. Carson, vice-president, in the chair. Double Flowers in *Epigæa repens*.—Mr. Thomas Meehan observed, that on several occasions, during the few past years, it had been noticed among the variations in nature, that the tendency to produce double flowers was, by no means, the special prerogative of the florist to originate. Many of our commonest wild flowers, which no one would think of cultivating, had double forms in cultivation which were no doubt originally found wild. Thus we had a double *Ranunculus acris*, *R. bulbosus*, *R. Ficaria*, *R. repens*, and some others. There were, in plants, two methods by which a double flower was produced. The axis of a flower was simply a branch very much retarded in its development, and generally there were, on this arrested branch, many nodes between the series forming the calyx or corolla, and the regular stamens and carpels, which were entirely suppressed. But when a double flower was produced, sometimes these usually suppressed nodes would become developed, in which case there was a great increase in the number of petals, without any disturbance in the staminal characters. But at other times there was no disturbance in the normal character of the axis. The stamens themselves merely became petaloid. This was the case in the *Epigæa*, recently found by Dr. Darrach.—Influence of Cohesion on Change of Characters in *Orchideæ*.—Mr. Meehan also said that in the early part of the winter he had exhibited some flowers of *Phaius Tankervillei*, in which, by the mere cohesion of one of the dorsal petals with the column, a flower differing very much from the general condition was the result. Since that time Dr. Maxwell T. Masters, in the issue of the *Gardener's Chronicle* for April 12th, notices the receipt of a *Phaius Wallichii* in which there had been produced three spurs and regular petals, looking, Dr. M. says, rather like those of a gladiolus than of an orchid.

May 13.—Dr. Ruschenberger, president, in the chair. The following paper was presented for publication:—"Observations on Nests of *Sayornis fuscus*," by Thes. G. Gentry.—Prof. Cope exhibited and described some extinct turtles from the Eocene strata of Wyoming.

May 20.—"Descriptions of new species of Orthoptera, collected in Nevada, Utah, and Arizona, by the Expedition under Lieut. G. M. Wheeler," by Cyrus Thomas.—"Observations on the Habits of the Neuters of *Formica sanguinea*," by T. G. Gentry.—*Lilium Washingtonianum*.—Mr. Thomas Meehan referred to a paper by Prof. Alphonso Wood, entitled a "Sketch of the Natural Order of Liliaceæ," of the Pacific coast, published in the volume of the Proceedings for 1868, in which he describes a "new species" of *Lilium*, as *L. Washingtonianum*, giving, as a reason for the name, that it was generally known as the "Lady Washington" by the miners. Prof. W. said, in his paper, that it was remarkable so fine a plant had been overlooked by other botanists. It so happens that it had not been overlooked, but had been described ten years previously by Dr. Kellogg, in the Proceedings of the California Academy for 1858.—"On a Species of *Delphinus*," by Dr. H. C. Chapman.

PARIS

Academy of Sciences, July 21.—M. de Quatrefages, president, in the chair.—The following papers were read:—Note on changes of rate in isochronous regulators, by M. Yvon Villarceau.—Third note on guano, by M. Chevreul.—New researches tending to prove that the co-ordinating power over bodily movements lies in the cerebellum, &c., by M. Bouillaud.—The laws of friction and concussion on the thermo-dynamical theory, by M. A. Ledieu.—On the movement of a spherical segment on an inclined plane, by Gen. Didion.—On the spectra of iron, and

some other metals, by Father A. Secchi. The author had failed when examining the iron spectrum given by a battery of fifty cells, to observe the line 1474K, and he gave, in the present paper, an account of a further search for it. The same battery power, with new acids, was used; various samples of iron were burnt in the arc, either as iron poles or placed in hollow carbon points, and the sunlight was reflected into the spectroscope with a heliostat. The line in question could not be found in any sample of iron used. His other observations are on the "structure" spectra of carbon and aluminium; he observes that each line of the columnar bands is itself resolvable into a mass of fine lines.—On the permeability of the Fontainebleau sands, by M. Belgrand.—On the movement of the wash produced in artificial canals, and on causing water to rise along an inclined bank to a sensibly constant height. A letter from Mr. Nordenskiöld, dated Mossel Bay, latitude 79° 54' N. was read by M. Daubrée.—New spectroscopic observations of the sun which do not agree with certain sun-spot theories, by Father Tacchini. The theories are those of M. Faye and Father Secchi. The author describes watching a facula over the sun and observing its appearance on the limb which was accompanied by the reversal of large numbers of metallic lines in the chromosphere. This, Tacchini considered as evidence of an eruption, and as militating against Faye's theory because he considers that theory not to allow of eruptions, and against Secchi also, he having stated that faculae were eruptions, and spots the erupted matter, and yet this facula had no spots during half a revolution.—On Euler's constant and Binet's function, by M. E. Catalan.—Researches on electric condensation, by M. V. Neyr-neuf.—Studies on nitrification in soils, by M. T. Schläpfer.—On a combination of picric acid, with acetic anhydride, by MM. Tommasi and David. The authors considered this body as a picale, in which one atom of metal is replaced by acetyl.—On pyrogallic acid in the presence of iodic acid, by M. Jacquemin.—On a natural combination of ferric and cuprous oxides, and on the production of atacamite, by M. C. Friedel.—On the spontaneous changes of eggs, by M. Gayon.—An attempt to determine, by comparative embryology, the analogous portions of the intestines in the superior vertebrata, by M. Campana. During the meeting, an election was made to the place of *Membre libre*, vacant by the death of M. Verneuil. M. de Lesseps obtained 33 votes, M. Breguet 24 votes, MM. du Moncel, Jacquemin and Sedillot, 1 each. M. de Lesseps was therefore declared duly elected.

BOOKS RECEIVED

AMERICAN.—Views of Nature: Ezra C. Seaman (Scribner & Co., N.Y.).
FRENCH.—Traité Générale de Photographie. 6th ed.: D. v. Monckhoven (G. Masson, Paris).

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ERRATA.—P. 201, col. 1, 1st line below table, after = insert λ. P. 246, title of Fig. 2, for *Salenica* read *Salenia*.