These sustentor ridges are homologous with the limb of the anal pro-legs and the exposed edge with the posterior border of said limb. They vary much in form, and may be more or less obsolete.

Fourthly, between them is what may be called the *rectal piece*, consisting of a piece more or less well marked and elevated, especially around the closed rectum.

It is principally by the leverage obtained by the hooking of the sustainers in the retaining membrane, which acts as a swing ing fulcrum, that the chrysalis is prevented from falling after the cremaster is withdrawn from the larval skin. It is also principally by this same means that it is enabled to reach the silk with the cremastral hook-pad. Yet the rectal ligament plays a most important part, and in some species a more important part even, in my estimation, than the membrane itself. The tracheal ligaments which, from a study of specimens plunged in alcohol when the larval skin was about half shed, I was at first inclined to believe important auxiliaries, are, I am now satisfied, of very little if any service in most cases. The rectal ligament is a constant physiological factor, and its importance cannot be ascertained by attempts to sever the membrane at the critical moment, because in such attempts the ligament is more or less drawn out beyond the power of the sphincter muscles in the chrysalis to control it.

Dissected immediately after suspension, the sub-joint of the larva will be found to be lying, especially between the legs and around the rectum, in an abundance of translucent, membranous material. An hour or more after suspension the end of the forming chrysalis begins to separate from the larval skin, except at the tip of the cremaster. Gradually the skin of the legs and of the whole sub-joint stretches, and with the stretching the cremaster elongates, the rectal piece recedes more and more from the larval rectum, and the sustentor ridges diverge more and more from the cremaster, carrying with them, on the sustainers, a part of the soft membrane. If a larva be carefully dissected at this stage, the forming membrane may be raised with the point of a needle, and stretched so as to show its connection with the rectal ligament; or it may be lifted entirely from the retainers, when, by its elasticity, it contracts, and becomes more or less fully absorbed in the rectal ligament. It is at this stage that the strength of the latter may be fully tested, and if the chrysalis, flayed from the larval skin, and freed from the retaining membrane, be grasped in the neighbourhood of the rectum, so as to supply the natural holding power of the sphincter muscles, the rectal ligament will sustain, as I have abundantly proved, at least ten or twelve times the weight of the chrysalis; while it will support, if held by the larval skin, several times the weight of the chrysalis before separating therefrom. In brief, the retaining membrane is that part of the inner larval skin surrounding the pro-legs drawn down by the sustainers, and always intimately connected with and forming but a branch of the rectal ligament. When extended from its attachments, as when the chrysalis rises to the silk, this membrane dries, and in the cast-off larval skin retains more or less perfectly the stretched form. If the corium of the larva be thick and strong, as in *Vanessa*, the dried membrane will be broad, with two indentations where it was held by the retainers; if the corium be more delicate, as in *Danais*, *Paphia*, or *Apatura*, the dried membrane will be more forked, showing how the retainers have acted upon its elasticity. In every case, however, it shows, under the microscope, the longitudinal folds and creases incident to the stretching, and, compared to the rectal ligament proper, it seems to lose importance as it is less needed; for the *succincti* will generally attach when it is severed or loosened from the retainers, while in *Apatura* (at least as exemplified in the North American species), which combines the peculiarities of both the *succincti* and *suspensi*,[1] it does not become specialised, and the chrysalis seems to rely almost entirely on the rectal ligament, assisted by the partial holding of the delicate larval skin, not only between what is left of the sustainers and the ventral posterior margin of the twelfth joint, but between the ventral sutures of this last and the preceding joint. And here I would remark, in conclusion, that the ventral borders of two or three of the joints preceding the subjoint are, in most chrysalids which I have studied, so hardened that the larval corium is actually grasped between them and the deep sutures made in contracting. In some instances (especially in some species of *Papilio*) the posterior border of the twelfth joint is produced into a medial transverse ridge fully as prominent as that formed by the sustainers, which here are flattened and coalesce; so that the sutures of some of the terminal joints in the chrysalis do subserve the purpose ascribed to them by Réaumur, but in a somewhat different way.

[1] The larva of *Apatura* attaches horizontally, making the front pair of abdominal pro-legs answer the purpose of the girth; but in the shedding of the skin this attachment is severed, and the forming chrysalis assumes the perpendicular position, and in the withdrawal and attachment of the cremaster it acts as the true *suspensi*.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THE Oxford *University Gazette* of October 10 contains counsel's opinions on the proposed faculty of Natural Science at Oxford. It has been proposed that the University should, by statute, establish a new faculty, under the name of "The Faculty of Natural Science," should grant degrees of Bachelor and Master in that faculty, and should give to Masters of Natural Science all the rights and privileges which are now enjoyed by Masters of Arts, so making them Members of Convocation (the governing body of the University), and enabling them to vote for the members returned to Parliament by the University. Mr. Horace Davey is of opinion that the University may create a new faculty in science, or (which comes to the same thing) may sever one of the sciences or philosophies formerly comprised in the Faculty of Arts, and may make it into a new faculty, and grant degrees therein. Such a severance was anciently made in the case of grammar, rhetoric, and music. But Mr. Davey believes that the University has no power to confer upon graduates in a new natural science faculty the rights which now belong to Masters of Arts, and the degree of Bachelor or Master of Natural Science would not make the holder a Member of Convocation. This difficulty Mr. Davey suggests, might be avoided by the University conferring the degree of Master of Arts on any person obtaining the corresponding degree in the new faculty.

The new chemical laboratories at the Oxford University Museum will be opened for students this term. The chemical department has now for many terms been overcrowded, and the new buildings will not only afford ample space for beginners and pass-men getting up their "simple salts," but contain rooms set apart for special work and fitted with the best appliances under the careful superintendence of Mr. W. W. Fisher, Aldrichean Demonstrator.

The new chemical laboratory at Balliol College will be opened this term under the superintendence of Mr. H. B. Dixon. Balliol and Trinity Colleges have combined to equip and maintain this laboratory, and a physical lecture room for the use of their own students.

At the University Museum Prof. Odling will lecture, this term, on Organic Chemistry; Mr. Fisher will lecture on Elementary Organic, and Mr. Donkin on Elementary Inorganic, Chemistry. Prof. Clifton will lecture on Elementary Electricity, and Prof. Story-Maskelyne on the Use of the Goniometer. Prof. Prestwich gives a course on two afternoons a week, on the Palæozoic Rocks, at the Museum, and Prof. Lawson will lecture on Vegetable Histology, at the Botanic Garden. Rev. C. Pritchard, Savilian Professor of Astronomy, will give practical instruction at the University Observatory, on fine evenings during the term; he will also continue giving public lectures on the history of astronomy. Dr. Rolleston will lecture on Circulation and Respiration, and practical instruction in anatomy and physiology will be carried on in the laboratory, under the superintendence of Mr. Robertson, Mr. Jackson, and Mr. Poulton. Mr. Barclay Thompson will lecture on the Anatomy of the Amphibia, at the Museum. At Christchurch Mr. Vernon Harcourt will give a course of lectures on the Elements of Chemistry, and Mr. R. E. Baynes will give a course on Mechanics.

At Magdalen College Laboratory Dr. Pike will lecture on Chemistry, and Mr. Yule and Mr. Chapman on Biology.

Exeter College has lost the valuable services of Prof. Lankester. Mr. Lewis Morgan, formerly house surgeon at the Radcliffe Infirmary, will carry on instruction in the biological laboratory of the College.

In the month of November there will be an election at Balliol College to a scholarship on the foundation of Miss Hannah Brakenbury, "For the Encouragement of the Study of Natural Science," worth 80*l.* a year (55*l.* and tuition free), tenable during residence for four years. There is no limit of age, but members of the University must not have exceeded eight terms from

matriculation. The examination will begin on Friday, November 21, at 10 A.M. Papers will be set in (1) Mechanical Philosophy and Physics; (2) Chemistry; (3) Physiology. Candidates are not expected to offer more than two of these subjects. There will be a practical examination in one or more of the above subjects.

The Science Scholarships at Exeter College have been awarded to Mr. Alfred Evans, of Aberystwith College, and Mr. Percy Morton, of Manchester Grammar School. *Proxime* Mr. Makinder. The examination was held in Biology, Chemistry, and Physics. An extra scholarship was awarded this year on account of the proficiency of the candidates.

MR. J. J. HUMMEL, who has studied at the Polytechnic School at Zurich, and in the Chemical Laboratory at the Royal Institution, Manchester, under the late Mr. Crace Calvert, and has had wide experience in the art of dyeing at some of the best establishments in the kingdom, has been appointed to the post of instructor in the recently founded School of Dyeing, at the Yorkshire College.

MR. A. J. BENTLEY, M.A., Fielden Lecturer at Owens College, has been appointed Principal of Firth College, Sheffield; we are told there were "forty applications for the post." The college is to be opened next week by Prince Leopold.

ON Wednesday last week, the Rev. J. Percival, M.A., LL.D., who, from the establishment of Clifton College, and for seventeen years, was its popular head-master, and to whose exertions the high position that College has taken among the public schools of the country is mainly due, was presented by the citizens of Bristol with a very handsome and valuable service of plate on his leaving that city for Oxford, he having been elected to the office of Principal of Trinity College, in that University.

SCIENTIFIC SERIALS

Reale Istituto Lombardo di Scienze e Lettere, Rendiconti, vol. xii. fasc. xvi.—Periodical variations of tension of atmospheric aqueous vapour and comparative humidity in the climate of Milan, deduced from thirty years' observations at the Brera Observatory, by Signor Schiaparelli.—Further studies on the pelagic fauna of the Italian lakes, by Prof. Pavesi.

THE *Rivista Scientifico Industriale* (No. 16), contains the following papers:—On the power of dry and moist air of absorbing radiant heat, by Prof. Eugenio Cicognani.—On the diffused vapour in the interior of liquids, by Prof. Giovanni Cantoni.—On the thermal and galvanometric laws of electric sparks produced by complete, incomplete, and partial discharges of condensers, by Prof. Emilio Villari.—On the discovery of nitrous acid in the presence of nitric acid, by Dr. Augusto Piccini.—On a new balance spherometer, by Prof. Domenico Surdi.

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, October 16.—M. Daubrée in the chair.—The following papers were read:—On the development of the perturbative function, &c. (continued), by M. Tisserand.—On artificial laurite and ferriferous platina, by MM. Sainte-Claire Deville and Debray. Laurite is got by heating to a bright red a mixture of ruthenium and iron pyrites. The sulphur from the pyrites combines with the ruthenium; the sulphide is dissolved in protosulphide of iron, and crystallises, on cooling, in regular octahedra, like natural laurite, or even in cubical crystals, easily separated from the iron by hydrochloric acid. A crystallised alloy of platina and iron is obtained by heating a mixture of platina and pyrites with borax, and treating with certain acids and potash.—Studies on the effects and the mode of action of substances employed in antiseptic dressings, by MM. Gosselin and Bergeron. The imputrescence of 1 gr. of blood is secured by a dose of 0·010 gr. to 0·015 gr. of carbolic acid; with smaller doses the putrefaction is retarded, but not prevented (at least if the dose be not gradually increased). As to the mode of action, the authors consider it is not exclusively by destruction of atmospheric germs (as Lister represents), but by the contact of the antiseptic producing coagulation of albumen. What the authors call the antiseptic alteration of the blood (by addition of a considerable proportion of carbolic acid or alcohol) consists (1) in thickening and yellowing (to the naked eye), and (2) in replacement of the globules by granular masses. This very rapidly-produced imputrescence could not be realised in wounds, the dose of antiseptic being too large; one can merely retard or diminish the putridity, and hope the blood will be absorbed before being altered in septicæmic degree.—On a sporadosideric meteorite that fell on January 31, 1879, at Becasse, Commune of Dun-le-Poelier (Indre), by M. Daubrée. The detonation was heard (about midday) at 20 km. distance. A sound as of a distant train preceded it, and it was followed by rumbling as of thunder. The meteorite (only one) was dug out from about 0·30 m. depth; it must have reached the ground almost vertically, while its trajectory seems to have been from south-south-east to north-north-west. It weighed 2·800 kg., and its form was roughly that of a pyramid with quadrangular base. It seemed to be chiefly formed of peridot and bisilicates (such as pyroxene or enstatite). The metallic grains consisted of nickelised iron, accompanied by tröilite. It belongs to the sub-group of oligosideres in the sporadosideric group.—On the mathematical theory of changes of brightness of double stars, by M. Gyldén.—The mildew, or false American oidium in the vineyards of France, by M. Planchon.—Extract of a letter to M. D'Abbadie, on the operations for junction of the triangulation of Algeria to that of Spain, by M. Perrier. These have been quite successful, and the meridian of France is now extended to the Sahara. The electric light was used in signalling.—On the synthesis of diphenylpropane, and on a new mode of formation of dibenzyl, by M. Silva.—Reaction of the cyanamide with the chlorhydrate of dimethylamine, by M. Tatarinoff.—On the cleistogamic state of *Pavonia hastata*, Cav., by M. Heckel. Physiologists who, like Pontedera and M. Bonnier, represent the *rôle* of nectaries to be that of organs of nutrition of embryos, have to give account of the fact that in the same cleistogamous plant, the close flowers, without nectar, are as fertile as the perfect flowers, sometimes more so, and sometimes fertile to the exclusion of these others.—Upper sands of Pierrefitte, near Etampes, by M. Meunier. He calls attention to some new species of molluscs represented there.—On the mineral associations contained in certain trachytes of the ravine of Riveau-Grand, in Mont Doré, by M. Gounard.—M. Chasles presented the first part of a memoir on the history of geodesy in Italy from the most ancient times to the middle of the nineteenth century, by Prof. Riccardi.—M. Larrey presented an English work by Mr. Longmore, on wounds by fire-arms.

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