which constantly depresses the average size of any useless structure; and that in a comparatively few cases, where changed conditions of life have rendered a previously useful organ actively injurious, the influence of selection may not only be withdrawn, but reversed. And if in justification of these views I were required to adduce any single tests as crucial, I should point on the one hand to the neuter ants, and on the other hand to the bower-birds. For the neuter ants prove to demonstration the fact of developing such important structures as enlarged and strengthened jaws through the agency of selection, and of totally losing such important structures as wings through the cessation of selection—in both cases under circumstances which effectually preclude the possibility of any inherited effects of use and disuse. On the other hand, the bower-birds no less conclusively prove the fact of developing highly elaborate and most remarkable instincts, which are entirely without reference to any life-preserving function, and therefore can be ascribed only to the inherited effects of functionally-acquired peculiarities.

If this paper has been at all successful in its objects, it must have brought into prominence one point which I am particularly anxious to make clear—namely, that it is a precarious thing to differ, in any point of biological doctrine, from the matured judgment of Charles Darwin. The more deeply his work is studied, the more profoundly is the conviction impressed, that even though he did not always give it, he always had a reason for the faith that was in him. Therefore, before his followers venture to question a doctrine which was sanctioned by him, common prudence should dictate a careful pondering of the matter. Some of the readers of NATURE may have been led to suppose that as to this I am myself living in a glass house. For my recent suggestion of an additional "factor of organic evolution" has had the effect of bringing many stones about my head with regard to this very point. But these have mostly been thrown by men who have not taken the trouble to acquaint themselves with the exact nature of Mr. Darwin's final judgment upon the points in question. As a matter of fact, there is only one point upon which I have deviated at all from the latest editions of Mr. Darwin's works—namely, as to the degree in which free intercrossing is inimical to natural selection—and, curiously enough, this is just the point which my critics for the most part disregard. I am blamed for my arrogance in disputing the universally adaptive character of specific distinctions, in affirming the generality of some degree of sterility between species, and so forth; but all these criticisms only serve to exemplify the truth of what I am now saying—namely, that before anyone ventures to write about Darwinism he should take the trouble to ascertain exactly what it was that Darwin thought.

GEORGE J. ROMANES.

THE AUGUST METEORS OF 1887.

THE circumstances attending the recurrence of this celebrated meteoric display were by no means favourable in the present year. On August 10 and 11 the moon rose before 11 p.m., so that during later hours the smaller and more numerous class of meteors, many of which would have been visible on a dark sky-ground, were obliterated. Apart from this, the night of the 11th was much overcast, and comparatively few observations could be secured. But, making every allowance for hindrances of this character, the recent shower has proved itself decidedly inferior to many of the conspicuous returns recorded in previous years.

But if this notable stream has been deficient in numerical strength, it has exhibited some features which, though previously observed, have never been capable of being so definitely and satisfactorily traced in their development as during the present year. I refer to the displacement of the apparent radiant point amongst the stars, and to the visible duration of the shower, both of which form important elements in determining the physical nature of the system and in theoretical investigations as to the perturbations which our earth may have exercised upon it during the frequent *rencontres* with its materials in past ages.

The very clear weather recently experienced enabled the progress of the display to be watched on fourteen nights between July 19 and August 14, and the radiant point on each one was determined separately, as by combining the results of several nights the changes in its position would have been rendered more difficult of detection. I first pointed out this change in the radiant in NATURE, vol. xvi. p. 362, and subsequently further details were published in the *Monthly Notices* for December 1884, pp. 97–98. In NATURE, vol. xxxiv. p. 373, will also be found the observations of this peculiarity made here in 1886, but they were not so complete as during the present year, when the radiant centres were successively derived as under.

Great Perseid Radiant Point 1887.

Night.	Radiant. α	Radiant. δ	Meteors.	Night.	Radiant. α	Radiant. δ	Meteors.
	°	°			°	°	
July 19	19	+ 51	4	August 1	35	+ 56	4
22	25	+ 52	5	6	42	+ 55	5
23	25	+ 52	4	7	43	+ 56	5
27	29	+ 54	5	8	43	+ 56	6
28	30	+ 55	10	10	42½	+ 57½	22
29	31	+ 51½	10	11	45	+ 57½	16
31	35	+ 54	11	14	53	+ 57	8

It will be noticed that these figures do not show a perfectly regular progression of the radiant in the direction of east-north-east. This is, however, entirely owing to observational errors which cannot be wholly eliminated from such determinations. Thus the radiant given above for August 6 is no doubt slightly east, and the one for August 10 slightly west, of the true positions. But these trivial discordances in individual positions do not affect the general result, which shows in the clearest manner possible that there is a rapid advance of the radiant from night to night. From all my observations since 1867, which include several thousands of Perseids, I believe this shower extends over a duration of at least forty days, from July 13 to August 22. The earliest visible meteors of the stream emanate from a point between Cassiopeia and Andromeda, while the latest ones diverge from the space separating Auriga and Camelopardus.

From its first oncoming to the epoch of culmination on the night of August 10 it does not gradually intensify but reaches a somewhat sudden maximum. I have sometimes found these meteors rather scarce on August 6, 7, and 8, and not much exceeding their observed frequency at the end of July. But on August 9 there is a marked increase, and on the following night it is apparent the shower attains its most brilliant effect. As to the displacement of the radiant this seems to be accelerated during the declining stages of the display. In July I find the degrees of right ascension of the shower nearly correspond with the days of the month, the diurnal advance being equivalent to about 1° of R.A., whereas on nights succeeding the maximum the change amounts to 2° of R.A. or even more. This difference in place is so striking that any observer may determine it for himself by watching the region of Perseus at the right epoch and charting, with the utmost accuracy, the directions of such meteors as presumably originate from the Perseid stream. These meteors generally leave streaks which furnish a ready means of fixing the paths with a degree of precision that could not be otherwise attained.

In NATURE for August 4, p. 318, I described my observations up to July 29 last. On July 31 I recorded 42 meteors in a watch of 3¼ hours, but the moonlight interfered considerably with the work, as it also did on following nights. The Perseids formed one-fourth of the visible meteors on July 31. I saw 25 meteors on August 1 in 3¼ hours, but the Perseid display was only just recognizable. At 12h. 18m. I observed a splendid fireball passing somewhat slowly from 338° + 43° to 164° + 70°. It left a bright streak or thick train in the latter part of its course, and it was evidently a member of the July Aquariads. At first it was scarcely brighter than a third magnitude star, but when near Polaris it became very brilliant, and afterwards lit up the northern sky with a flash much stronger than the moonlight. I saw 7 other Aquariads on the same night.

On August 6 observations were continued, and 28 meteors were seen in 4¼ hours. Besides the usual shower of Perseids I was much interested in finding a companion radiant at 31° + 49°, which was very sharply defined. I observed a shower on August 11–13, 1880, from 30° + 46° which may be the same; and there is a great probability that this system is connected with Comet I. 1870, which passed near the earth's orbit and would give a radiant near that of the meteor shower and at the same epoch.

On August 7, 23 meteors were seen in 2¾ hours. Only 5 Perseids were recorded. On August 8, 14 meteors were seen in 2½ hours during moonlight, and of these one appearing at 10h. 34m. was as bright as Jupiter. Its course was from 6° + 67½° to 302° + 60½°, and it left a bright streak. At 11h. 28m. a fireball was seen moving rather swiftly from 349° + 15° to 9° + 14¼°, so that its path was one of 20° just above γ Pegasi. At its end

point the meteor burst out with a great accession to its brilliancy, and there was a vivid flash, though the moon was near. The radiant of this fine meteor was probably near Delphinus at 304° + 11°.

On August 10, before midnight, the Perseids were by no means numerous. Only 22 were seen during 1¼h., and after the moon rose the display was not critically watched, as observations made during moonlight are not comparable with those obtained under more favourable conditions. There were fine meteors now and then, but the phenomenon never developed into an imposing shower. On August 11 the sky was much overcast, and not many shooting-stars were discerned. In 1 hour before 11h. 30m., when the firmament was fairly clear, I counted 21 meteors, of which 16 were Perseids. On August 14 the weather became very fine, and I enumerated 45 meteors in a 4½ hours' watch. There were only 8 Perseids, and amongst the meteors I registered were about 5 Aquariads from the same radiant as at the end of July. I also noticed the Aquariad shower at the middle of August in 1877, and in 1879 on August 21, 14 meteors were traced from 339° – 10°, so that it would appear this system is prolonged until the end of the third week in August, and without any apparent displacement of the radiant point. The members of the latter stream are widely dissimilar in their visible aspect to the Perseids, and move slowly, often covering considerable arcs before extinction. In its chief richness the shower belongs to the July meteoric epoch, though sometimes, as in the present year, remaining conspicuous until the middle of August or even later than that, as in 1879.

Bristol. W. F. DENNING.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, August 16.—M. Janssen in the chair.—Note on the work recently carried out at the Observatory of Meudon, by M. J. Janssen. Special reference is made to the many successful solar photographs already obtained, representing the history of the solar disk for the last ten years. The processes are now so perfected that on the same plate the details are taken both of the brighter and less luminous parts, such as the edge of the disk and the penumbræ of the spots. Photographs ten times enlarged were exhibited of the extremely interesting spots taken on June 22, 1885, and last June. The striæ of the penumbra and the faculæ surrounding the former consist of granulations, in form and size resembling those constituting the entire solar surface. The same phenomenon reappears on the large round spot photographed last July, so that it seems all but demonstrated that the whole solar disk has a uniform constitution, and that the so-called granulations are in fact the constituent elements of every part of the surface of the sun.—Fresh researches on the relations existing between the chemical and mechanical work of the muscular tissue (continued), by M. A. Chauveau, with the co-operation of M. Kaufmann. Here a determination is made of the coefficient of the quantity of mechanical work produced by the muscles performing useful work in the physiological conditions of the normal state. By translating into absolute measurements the indications furnished by the dynamograph already referred to, it is shown that the muscular work performed may be estimated at about 31 to 35 millionths of calorie.—Some further remarks on the radicular nature of the stolons in Nephrolepis, by M. A. Trécul. In reply to M. Lachmann's recent note, the author again shows that these stolons are not stems or stalks, but true roots. No matter what their length, they never produce leaves, have always the structure of roots, and as they alone represent the primary roots of Nephrolepis, the expression "radicular stolons," applied to them by the author, is fully justified.—New fluorescences with well-defined spectral rays (continued), by M. Lecoq de Boisbaudran. The author here treats fully the combination of alumina and the earth $Z\beta_2O_3$, which, without being pure, is very rich in $Z\beta$ and poor in $Z\alpha$. Alumina with 1/50 of this earth heated with sulphuric acid and moderately calcined shows a somewhat yellowish-green fluorescence, much more vivid than that of alumina containing the same quantity of $Z\alpha_2O_3$ impure. The fluorescences have also been examined of calcined alumina containing the oxides of Ce, La, Er, Tu, Dy, Yb, Gd, Yt, and U. During these researches several rays were noticed apparently belonging to none of the already determined elementary bodies. Some of these rays may perhaps correspond to the substances announced by Mr. Crookes; but each case will have to be determined for itself.—Determination of the longitude of the Observatory of Tacubaya, Mexico, by MM. Anguiano and Pritchett. Continuous observations spread over six months show a definite longitude of 6h. 36m. 46·56s. west of Greenwich, which will require a correction of close upon 5s. for the accepted longitude of the capital of Mexico.—Electric excitement of the liver, by MM. Gréhant and Mislawsky. The question is discussed, whether the excitement of the liver by electricity increases the quantity of urea contained in the blood. In opposition to the views of M. Stolnikow the experiments here described show that variations in quantity occur only in the arterial blood, and that the blood of the supra-hepatic veins presents no change in the weight of the urea after electric excitement of the liver.—Dissemination of the Bacillus of tuberculosis by flies, by MM. Spilmann and Haushalter. Observations recently made in consumptive-hospitals seem to show that the virus (Koch's Bacillus) may easily be disseminated by the house-fly.—Note on Hæmatocytes. by M. Fokker. The author recently showed that the protoplasm taken from a healthy animal and protected from microbes survives and may produce fermentations. Here he continues his researches, showing that this protoplasm is capable of generating a vegetable form different from that under which it existed in the animal organism. But the Hæmatocytes thus produced do not multiply themselves in a cultivating medium, and their development should perhaps be described as a case of heterogeny.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Dijmphna—Togtets Zoologisck—Botaniske Udbytte: Dr. Chr. Fr. Lütken (Kjobenhavn).—Seven, the Sacred Number: R. Samuell (K. Paul).—University College, Dundee, Calendar 1887-88 (Leng, Dundee).—Qualitative Chemical Analysis: Dr. C. R. Fresinius, 10th edition, translated by C. E. Groves (Churchill).—Notes to accompany a Geological Map of the Northern Portion of the Dominion of Canada: G. M. Dawson (Montreal).—Die Geoiddeformationen der Eiszeit: E. von Drygalski (Berlin).—Proceedings of the Linnean Society of New South Wales, 2nd series, vol. ii. Part 1 (Cunninghame, Sydney).—Verhandlungen der Naturhistorischen Vereines, Fünfte Folge, 4 Jahrgang, Erste Hälfte (Max Cohen, Bonn).

CONTENTS.

PAGE
The Health of Nations 385
The Forestry of West Africa 387
Our Book Shelf :—
"Annals of the Astronomical Observatory of Harvard College" 388
Symons: "The Distribution of Rain over the British Isles during the Year 1886" 388
Letters to the Editor :—
Slate Ripples on Skiddaw High Man.—**J. Edmund Clark** 388
Dr. Klein and "Photography of Bacteria."—**Dr. Edgar Crookshank** 388
The Landslip at Zug. By **Prof. T. G. Bonney, F.R.S.** (*Illustrated*) 389
The Norwegian North Atlantic Expedition 390
The Colours of Thin Plates. By **Lord Rayleigh, F.R.S.** 391
Fifty Years' Progress in Clocks and Watches. I. By **Henry Dent Gardner.** (*Illustrated*) 392
The Recent Drought. By **Fredk J. Brodie.** (*Illustrated*) 395
Thunderstorm in London. By **Chas. Harding** . . . 397
Spencer F. Baird 397
Notes 398
Our Astronomical Column :—
Magnitudes of *Nautical Almanac* Stars 401
Comet 1887 *e* (Barnard, May 12) 401
Astronomical Phenomena for the Week 1887 August 28—September 3 401
The Factors of Organic Evolution. By **Dr. George J. Romanes, F.R.S.** 401
The August Meteors of 1887. By **W. F. Denning** . 407
Societies and Academies 408
Books, Pamphlets, and Serials Received 408