

a much larger quantity. Here again we may observe the instance Mr. Bennett quotes, the mimicry of *Leptalis* to *Ithomia*. *Leptalis* is normally a white insect, and as such, would be more liable to attacks from its persecutors, as shown by Mr. Wallace, while any variation which gave colour to the wing would make the insect less conspicuous, and being useful to it, would be preserved.

That we are quite ignorant of the laws regulating variation is quite true, and that when we do understand them it will throw much light on these questions is undoubted, and that we may probably find in them some additional explanation for many of the facts now accounted for by Natural Selection; and Mr. Bennett does good service in the cause of truth in reminding us of what still has to be done.

S. N. CARVALHO, JR.

London, Nov. 17

FOUR years ago I advanced the opinion that Natural Selection is insufficient to explain the "Origin of Species," and that, rather, the origin of the variations of which Natural Selection is said to avail itself must be looked to for this purpose. I may perhaps, therefore, be allowed to say a few words in examination of Mr. Wallace's explanation of this point in last week's NATURE.

One of the objects of Mr. Darwin has been to show that the existence of species as an absolute entity is a mere idea of our minds; that if we could at the same moment look around us in space, and also backwards in time, we should find the organic world connected together as one whole, one great mass of beings extremely closely allied to each other, and distinguishable only by an accumulation of small and perhaps scarcely appreciable differences. A second and closely-connected object has been to show that this great mass of beings has had a common origin from one primeval ancestor (or at most a few ancestors). These two points are the chief ones involved in the "Origin of Species" question, as it is ordinarily understood; and if they be borne in mind, it will be seen that the doctrine of "Natural Selection, or the Survival of the Fittest," deals with only a small portion of the numerous problems involved in this great question. I am sure that Mr. Wallace, after having written as he has done about man, that in his case other influences than this survival of the fittest have been at work, may reasonably allow importance to other powers than Natural Selection in the case of other organic beings.

If Mr. Darwin's book had been entitled "The Influence of Natural Selection on the Formation of Species," some misconceptions might, perhaps, have been avoided. Its present title undoubtedly tends to convey the idea that Natural Selection is *per se* the Origin of Species. I believe Mr. Darwin, however, holds no such idea.

The picture above alluded to, of a complicated mass of beings connected together by innumerable gradations, is so different from what we find existing around us, that one of the first questions suggested by it is, where are the connecting links? This first question has never yet been answered to any extent, or with anything like adequacy. The links produced are but few, and not sufficient to bear the great weight attached to them. For at no period of the geological record do we find any traces of the general and intimate connection of beings with one another that Mr. Darwin's views would lead us to look for. The creatures composing the organic world at any one given moment were, so far as the evidence of geology goes, separated from one another by lines of demarcation of similar value to those existing among animals now.

What is wanted to explain the phenomena of various limited and defined species arising from one common ancestor is, then, first, a law, or group of laws, to throw light on the origin of variation and dispersion; and, second, another law or laws to explain the limitation and separation of the varieties so produced. It is quite out of the question to suppose that the theory of Natural Selection does all this. Those, however, who have studied Mr. Spencer's work will be well aware that his theory of evolution may be applied to deal with the question in this its more extended light. And I believe that those who wish well for the survival of Natural Selection will do well to insist on its only being considered in connection with a more extensive doctrine of evolution. This is where I think Mr. Wallace errs in his advocacy.

I will not here allude to the question of mimicry more than to say, that Mr. Wallace has never answered, but rather avoided, the chief difficulties now advanced against it; and that his theories on the subject are undoubtedly open to the objection

that he insists on seeing all the phenomena from the point of view of a natural selectionist, and nothing more. As Mr. Wallace has, however, already discovered that Natural Selection, though applicable to man, is not sufficient, unsupplemented, to account for him, we may hope that he will yet see this with regard to the rest of the organic world.

D. SHARP

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The Chromosphere

WHILST mapping down, in preparation for the coming eclipse, all the bright lines that have so far been observed and accurately measured in the chromosphere or solar prominences, I was struck with the absence of a faint yellow line, which I have myself several times observed whilst examining the contour of the sun's disc. This line is probably identical with Angström's absorption line 5883'0 (spectre normal du soleil), D' lying almost midway between D' and the line in question. There is no danger of mistaking it for the bright yellow line seen in every solar prominence, and lying near Angström 5865'1, since the two yellow lines were seen on each occasion at the same time on the more refrangible side of D'.

I suppose the D'', mentioned in a late communication from Dr. Young, to be identical with the bright yellow line, for it is most improbable that he could have failed either to see or to record the bright line whilst mentioning the faint one, since the latter, as far at least as I have observed, is never visible unless in company with the former.

The only observation that I can at all identify with my own is that mentioned in NATURE, December 16, 1869, where Mr. Lockyer, speaking of the absorption line, which corresponds to the orange line of the chromosphere, says that Padre Secchi's bright line is less refrangible.

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S. J. PERRY

From London to Catania

A FEW practical details as to the best way of getting to Sicily, the accommodation to be found there, &c., may be of use to many readers of NATURE who are thinking of going there next month.

We have first the sea passages from London, Southampton, or Liverpool, to Messina or Malta, of which if any be chosen it will probably be that from Southampton to Malta by the P. and O. steamers, which start every Saturday at 2 P.M., and are nine days on the voyage. (Fares 20*l.* and 10*l.*) From Malta there are steamers twice a week to Messina; they touch at Catania when the weather permits them to enter the small harbour, otherwise they go on to Messina, so that passengers for Catania must in that case avail themselves of the railway.

Few probably will wish to go the whole way by sea, the land route therefore by which the Indian mails are now sent will be taken; viz., over the Brenner Pass. The night mails leave Charing Cross at 8.45 P.M., Cannon Street at 8.50 P.M., Victoria and Ludgate Hill at 8.30 P.M., and arrive in Dover in time for the Calais and Ostend boats; the line from Calais to Brussels may not be practicable, and so the longer passage to Ostend may be preferred; by going straight on one ought to arrive at Cologne at 4 P.M. the next day (if one goes by Calais one has three hours' rest at Brussels). The day service train, first and second-class, leaves all the stations at 7.40 A.M., and one should arrive at Cologne *via* Ostend at 10.55 P.M. (*via* Calais at 4.50 A.M. next day.) From Verviers to Cologne there are only first-class carriages in this train. The fares to Cologne by Ostend are 3*l.* 8*s.* 10*d.* first, and 2*l.* 9*s.* 5*d.* second-class, by Calais they are 3*s.* or 4*s.* more.

Those who like to go from London to Ostend or to Antwerp *direct* can leave St. Katherine's Wharf by steamer on Sunday, Tuesday, or Thursday mornings for Antwerp, or on Wednesday or Saturday mornings for Ostend, and proceed by rail to Brussels, the fares from London to Brussels being 30*s.* first and 22*s.* 3*d.* second class, *via* Antwerp; 26*s.* 8*d.* first and 20*s.* 10*d.* second class, *via* Ostend. The fare from Brussels to Cologne is about 25 francs first and 18 francs second class by the ordinary trains; express about three francs more.

The way then is by Coblenz, Mayence, Darmstadt, and Aschaffenburg to Munich. By leaving Cologne by the 6 A.M. express, one ought to get to Munich at 9.10 P.M. In times when through-tickets are granted the fare by Ostend and Cologne to Munich is 6*l.* 7*s.* 3*d.* (on London (first class), and 5*l.* 10*s.*

mixed first and second; this will give some idea of what the cost will be.

After Munich the regular trains may be relied on; one can leave Munich at 9.50 P.M. (first and second class), pass Innsbruck, and crossing the Brenner in the early morning descend the Italian side in the forenoon, getting to Verona at 1.20 P.M.; or by leaving Munich at 10.15 A.M. (first, second, and third class) one may get to Verona at 5.50 A.M. next day; but in this way one misses the best of the scenery. The fares from Munich to Verona are about 37s., 25s., and 18s.

The way, then, is to Padua, Bologna, Pistoia, and so either to Florence or to Leghorn (by Pisa); from Florence to Rome, passing by Lake Trasimene; from Leghorn to Rome by the coast line, or else straight to Messina or to Naples, and then to Messina, by one of Rubattino's boats, which leave almost daily. From Rome one goes to Naples by train, and thence by boat to Messina, passing close to Stromboli. Some of the boats go on to Catania, but it is advisable to land at Messina and take the train, as often the steamer cannot get into the harbour at Catania, in which case it goes on to Malta. The railway fares from Verona to Naples come to about £4 10s. first; £3 5s. second; and £2 5s. third class.

By travelling almost incessantly one should (supposing the trains regular) get to Naples from London in five days and six nights by this route: no time is lost by spending a night at Cologne.

At Messina, the Custom House authorities are usually rather troublesome, but one does get off at last, and, passing along a most exquisite coast-line, arrives at Catania (*Kat' Atrvny*).

The hotel at which to stay, if possible, is the Grande Albergo, kept by Herr Werdenberg, where there is every comfort, the very small salon being redeemed by the fine billiard-room. The front rooms face towards the north, and are cold and unsuited for invalids, but they (especially those of the third story) afford a most splendid view of Etna, the sunrises and sunsets seen from them being superb. The rooms at the back are much warmer, but of course give no sight of Mongibello. The Grand Hôtel Central is an Italian establishment in the Piazza dell' Università, and may be considered to be the second, though much inferior to the first-mentioned house.

In Catania itself a good post of observation would probably be the Giardino Bellini on the Corso; it is high and sufficiently large.

To go to Nicolosi a two or three-horse carriage is necessary. There are at this village two inns, one at the entrance to the village (not to be recommended), the other one, which is preferable, farther on in the village. The accommodation is of a very primitive description. Everything should be taken from Catania, as little can be got at Nicolosi.

From Nicolosi one can visit the Monti Rossi (in half-an-hour or three-quarters), from which one has a magnificent view, and one can, if one is curious enough, go down into a hole, known as the Fosse dei Palumi, a volcanic vent.

It is from Nicolosi that the ascent of Etna is made, and a description of an ascent, under especially favourable circumstances, will be found in the number of NATURE for June 23 last.

The best guide is Pietro Cravagna, who knows the mountain thoroughly, and who also speaks tolerable Italian; he is in every way to be trusted, and if another guide be necessary, it will be well to let Pietro find him. The writer was on one occasion subjected to great annoyance from the incompetence of one of the so-called guides.

The Casa del Bosco, about two-and-a-half-hours' ride from Nicolosi, is uninhabited during the winter. A fire of sticks may be made there, and a few plates, &c., will be found; the key must be got at Nicolosi; there is plenty of good water close at hand. This house might be used for purposes of observation; it has two rooms, and an outhouse for the mules.

The Casa degli Inglesi, near the top of Etna, is almost sure to be buried in the snow.

In descending from the summit it may perhaps be possible to go down into the Valle del Bove, and return to Catania by Zafarana. Those who visit Sicily should not return home without stopping a day or so at Taormena (between Catania and Messina), and seeing a sunrise from the ruins of the theatre.

W. H. C.

The Spectrum of the Aurora

As some of your correspondents seem scarcely aware of what has already been accomplished in observation of the auroral

spectrum, perhaps I may be pardoned a few remarks on the subject.

The line usually most prominent in the auroral spectrum is a yellowish green one, the wave-length of which was measured by Angström as 5567, and its position by Professor Winlock as 1280 on Huggins' scale, which, reduced to wave-length, closely agrees with the determination of Angström.

Angström also observed the same line in the spectrum of the zodiacal light, in March 1867, but it seems possible it might be due to faint aurora concealed by the light. He says that "it is a remarkable fact that this bright band does not coincide with any of the known rays of simple or compound gases which I have as yet examined." The wave-length of H β is about 4862; much less than that of the auroral line. Angström also saw three very feeble bands near H β (F).

Professor Winlock (*American Journal of Science*, Nov. 1869,) states that in addition to the line at 1280 Huggins' scale, he saw six faint bands, viz., at 1400, 1550, 1680, near F, 2640, and near G.

In the *American Journal of Science*, Sept. 1869, it is stated that during the solar eclipse a bright line was seen in the spectrum of the corona at 1474 of Kirchhoff's scale, and that it coincided with an auroral line. 1474 Kirchhoff corresponds to about 1550 Huggins' scale.

I have also somewhere seen it stated that the auroral line at 1280 coincided with a telluric line in the sun's spectrum, which might be possibly due to oxygen.

I have myself seen several feeble bands between the green line and F, but owing to their faintness have not yet been able to determine their position with much accuracy.

The red line which was so bright in the aurora of the 24th and 25th ult. is only occasionally visible. Mr. T. W. Backhouse has observed it repeatedly, and informs me that it is sometimes visible when the aurora does not appear red to the eye, but that he never recollects seeing it when some part of the sky was not red. This quite agrees with my own experience. As your correspondent, "T. F." observes, the red line probably belongs to a spectrum distinct from that of the green line, and may be due to some other gas. It may, however, be only a fresh line of the same gas due to different temperature. Its position from repeated direct comparison is about $\frac{1}{4}$ of the distance from H α to Na. as I stated a week or two since. It is, therefore, not identical with H α , to which the ordinary red light of ignited hydrogen is due.

Changes of pressure and temperature do not affect the position of lines, but merely influence their breadth and intensity, making new lines visible and expanding old ones. Sometimes, as in the well-known case of nitrogen, an entirely fresh spectrum is produced; but while any line remains visible its position is unchanged. Hydrogen gives several such spectra, but I believe none of them have a line in the position of the auroral one.

I am at present engaged in a little research on the spectra of certain gases in relation to that of the aurora; but it is not yet sufficiently advanced for publication.

It is particularly desirable that the positions of lines should be accurately determined. In the case of the aurora I am acquainted with no better method for doing this than by comparison with such a spectrum as the band spectrum of N. This is a most convenient natural scale, with thirty or forty brilliant bands; and may readily be obtained from a small tube containing rarefied air or nitrogen, by the aid even of a Ruhmkorff's smallest coil.

With regard to the spectroscopic, a simple flint glass prism fitted to a tube carrying an adjustable slit, and without any lenses, gives a brighter spectrum than any other form of instrument that I am acquainted with.

HENRY R. PROCTER
Clementhorpe, North Shields, November 12

The November Meteors

ON the nights of the 12th, 13th, and 14th of November the sky was constantly watched from 5 P.M. to 7.30 A.M. The weather throughout was most unfavourable.

On Nov. 12th it was completely overcast from 7 P.M. to 7.30 A.M.

On the 13th from 5 P.M. to 7 P.M. the amount of cloud was $\frac{1}{4}$, and only one meteor was seen. The sky was then obscure until near 1 A.M. of the morning of the 14th.

Nov. 14th, from 1 A.M. to 3.50 A.M., the amount of cloud was $\frac{1}{8}$, and four meteors were seen, two starting from near γ Leonis.