After awhile, as the full daylight broke, it left the smoky region above and came down towards the deck, and I then discovered it to be neither bird nor bat, but a specimen of the death's-head moth, *Sphinx Atropos*, whose flight I then witnessed for the first time. After running the gauntlet of several of the passengers, who tried to catch it with their hats, it settled somewhere on the spars or woodwork of the boat and escaped, perhaps to renew its flight in a similar manner the following day.

Highfield, Gainsborough, December 21 F. M. BURTON

The Selective Discrimination of Insects

MAY I be permitted to remark on Mr. Bridgman's communication in NATURE (vol. xvii. p. 102)? He says he has collected pollen grains of different kinds washed from the thigh of an *Andrena nigro-ænea*, and varying in colour from orange-red to white. The true inquiry as to the discrimination of insects is not as to the colour on distinct kinds of pollen, but their homogeneity in respect of fertilisation.

The remark I made implied, rather than expressed, that bees and butterflies visited only those plants the admixture of the pollens of which induced fertilisation. In this respect and in this only, it appears to me, the investigation of the subject becomes of importance. No fact of natural phenomena is without use and without instruction; there are *no hap-hazards* in nature. If Mr. Bridgman, or other naturalists, can show the admixture of the diverse grains of pollen collected by him from the thighs of the creature named would not induce the fertilisation of the plants from which they were collected, then the discriminatory fact assumed is dispelled and the peculiarity observed by Mr. Forbes and myself, and doubtless by others, becomes of little value. The colour of the pollen grains is of no importance in the inquiry, as observation shows; the discriminatory fact, if it has any importance, is not as to variations in colour, but the collection of the pollen from distinct species of plants the admixture of which *would not induce fertilisation*. If it be proved that the admixture of the collected pollens are only such as induce fertilisation, then a natural phenomenon is disclosed of great importance. This is the fact I imagine Sir John Lubbock meant when he advised the pursuit of the inquiry.

I am still of opinion that it is *odour*, not colour, which is the attractive element. It is so with carrion birds and the blow-flies which collect on the fœtid arum. In phenomena one particular law appears to be repeated in all the natural kingdoms. The same rule is also to be observed in physics. S. B.

Sunbury-on-Thames

OUR ASTRONOMICAL COLUMN

THE TOTAL SOLAR ECLIPSE OF A.D. 418, JULY 19.—Philostorgius, in his "Epitome of Ecclesiastical History," relates that while Theodosius the Second was a youth, on July 19, at the eighth hour of the day, the sun was so greatly eclipsed that the stars were seen, and while the sun was thus hidden there was seen in the sky a light in the form of a cone, "which some ignorant people called a comet"; and he goes on to describe the supposed differences in the appearance of the phenomenon from that of a comet, particularly remarking that it resembled the flame of a torch, subsisting of itself, without any star to serve as a base, and adding particulars of its track and duration. That the object thus singularly discovered during a total, or nearly total, eclipse of the sun, was really a comet as the "ignorant people" supposed, is proved by the records in the Chinese Annals. The eclipse to which reference is made by Philostorgius took place on July 19, A.D. 418. The comet of that year is stated in Pingré's *Cometographie* to have been discovered in the 10th moon, commencing November 15, in which he follows the Jesuit, Couplet, but the account given by Mr. Williams, on the authority of the She Ke and Ma Twan Lin, dates the appearance of the comet on day Kang Tsze of the 5th moon, when it was situate in Ursa Major; on September 15 it was on the confines of Leo and Virgo; "it was bright, and gradually lengthened until it was 100 cubits in length." Philostorgius also refers to the passage of the comet through Ursa Major, and says it continued visible until the end of the autumn.

It may interest some readers to have particulars of the eclipse, during which it is recorded that a large comet was first discovered. The following figures depend upon a very similar system of calculation to that applied to other ancient eclipses, described in this column:—

G.M.T. of Conjunction in R.A. 418, July 18, at 23h. 3m. 17s.

Right Ascension	118°	30′	48″
Moon's hourly motion in R.A.		38	34
Sun's ,, ,, ,, ...		2	32
Moon's declination	21	23	10 N.
Sun's ,, ...	21	2	41 N.
Moon's hourly motion in decl.		3	40 S.
Sun's ,, ,, ,, ...		0	28 S.
Moon's horizontal parallax		59	38
Sun's ,, ,, ...		0	9
Moon's true semi-diameter		16	15
Sun's ,, ,, ...		15	48

At Constantinople these elements give a very large eclipse, commencing at oh. 5m. and ending at 2h. 50m. local mean time, magnitude, 0·95; at a short distance to the south the eclipse would be total.

VARIABLE STARS.—The following are geocentric minima of Algol and S. Cancri during the ensuing two months, so far as they are visible in this country. They are expressed in Greenwich mean time, and are calculated from Prof. Schönfeld's elements:—

ALGOL

	h.	m.		h.	m.
Dec. 31	12	29	Jan. 28	4	41
Jan. 2	9	18	Feb. 5	19	8
,, 5	6	7	,, 8	15	58
,, 16	17	23	,, 11	12	47
,, 19	14	13	,, 14	9	36
,, 22	11	2	,, 17	6	26
,, 25	7	52	,, 28	17	43

S. CANCRI

	h.	m.		h.	m.
Dec. 31	10	20	Feb. 7	8	51
Jan. 19	9	35	,, 26	8	7

ASTRONOMICAL PHENOMENA IN 1878.—The principal astronomical occurrence of the next year is the total solar eclipse of July 29, which traverses British Columbia and the United States; the American astronomers will doubtless give a good account of it, and it is reported they are likely to have coadjutors from this side of the Atlantic. There will be a transit of the planet Mercury on May 6, visible in this country to past the time of the nearest approach of centres, and a lunar eclipse on August 12, magnitude 0·6, wholly visible here. Mars will be occulted by the moon on the evening of June 3, and the second-magnitude star σ Sagittarii on the afternoon of October 30; on November 10 the moon traverses the Pleiades. A return of Encke's comet to perihelion also takes place in the summer, but not under favourable circumstances for observation, and the comet of short period detected by Tempel on July 3, 1873, will again arrive at perihelion late in the spring. Saturn's rings disappear on February 6, but reappear on March 1, according to Bessel's elements.

FERTILISATION OF GLOSSOSTIGMA

THE following letter to Mr. Darwin has been forwarded to us by him for publication:—

"Museum, Auckland, October 23, 1877

"My Dear Sir,—I forward to you a copy of a paper on the fertilisation of *Selliera*, one of the *Goodeniaceæ*, which perhaps you may care to glance over. When I wrote it I did not know of your notes on *Leschenaultia*, published in the *Gardener's Chronicle* for 1871. In both plants the pollen is shed before the expansion of the flower, and neatly collected in the indusium, but in *Selliera* the stigma is situated within the indusium, and by its gradual upward growth after the flower expands slowly forces out the pollen, which is then transferred by insects to older

flowers. When mature, the stigma protrudes considerably beyond the indusium. This appears to differ entirely from what takes place in *Leschenaultia*.

"I have recently been much interested with the curious irritability displayed by the stigma of *Glossostigma elatinoides*, one of the Scrophularineæ. The style is dilated towards its apex into a broad spoon-shaped stigma, which, when the flower expands, is closely doubled over the four stamens, entirely concealing them from view. If the front of the bent part of the style is touched it at once springs up, uncovering the stamens, and moves back to the upper lobe of the corolla, to which it becomes closely applied. In this position it remains for a few minutes, and then slowly moves back to the stamens and curves over them as at first. It appears to me that this irritability of the stigma is simply a contrivance to insure cross-fertilisation, for an insect crawling into the flower must inevitably touch the stigma, which would then uncover the stamens. On withdrawing, the insect would be certain to dust itself with pollen, but it would not by this effect the fertilisation of the flower, for the stigma would be then closely applied to the upper lobe of the corolla, entirely out of its way. If the insect were, however, to visit another flower it is evident that it must come into contact with the stigma at its first entrance and would doubtless leave some pollen thereon. The movement of the stigma is remarkably rapid, and its apex must pass through an angle of at least 180°. I have been unable to find a record of a similar case, or of so pronounced a degree of irritability in the stigma of any plant. The movement of the lobes of the stigma in *Mimulus* is much weaker, and is through a much less angle. Yours faithfully,

"T. F. CHEESEMAN

"Charles Darwin Esq., F.R.S."

A TELEPHONIC ALARUM

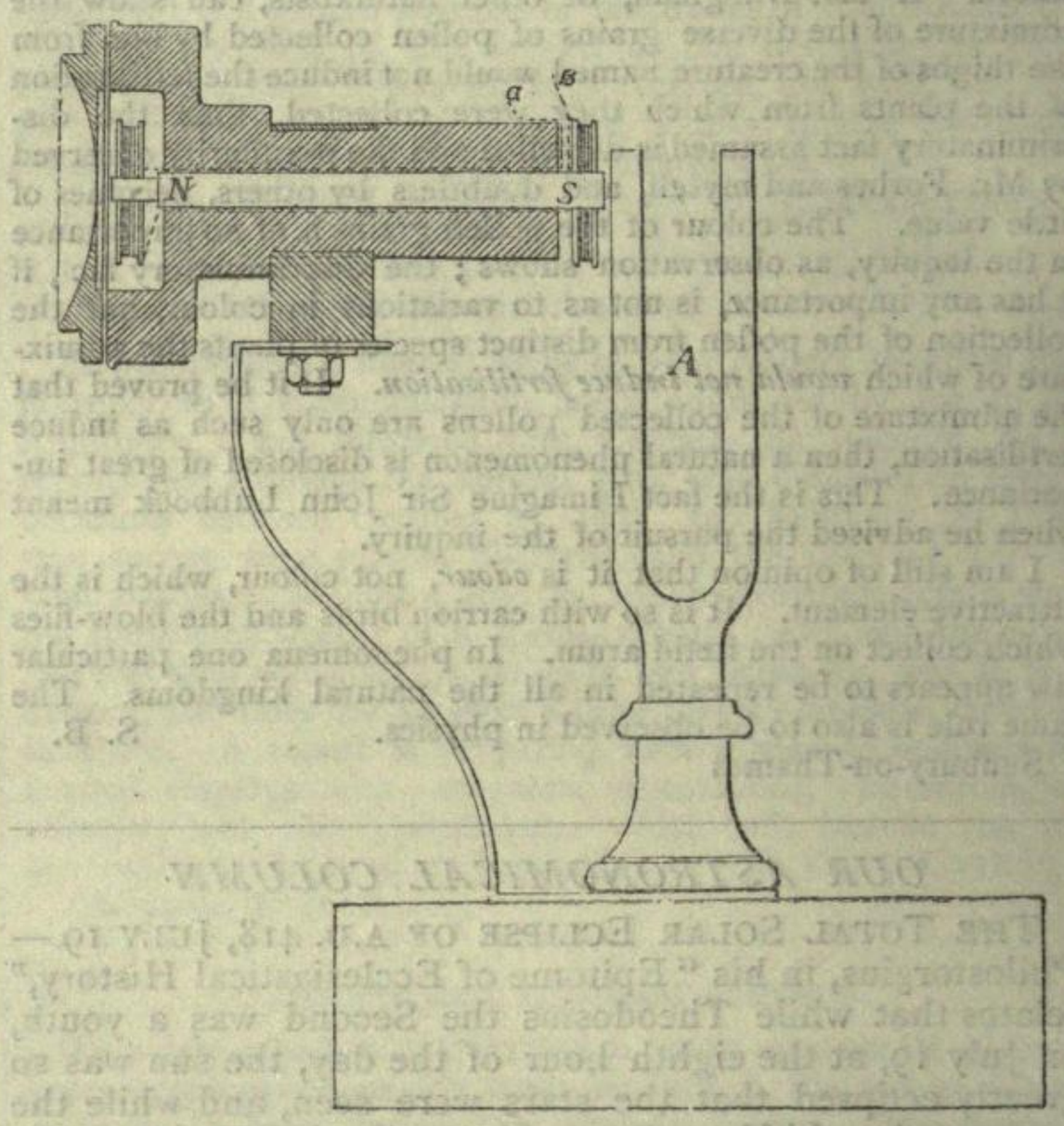
THE speaking of the telephone is admittedly so weak that it can only be caught by keeping the instrument in immediate contact with the ear. Hence there is transmitted through the telephone in its present form no sound which would be intense enough to announce to any one who was in a large room and who did not hold the telephone close to his ear, that a message was about to be sent from the transmitting station. The consequence is that a warning apparatus must be attached to the telephone, so that there may be no fear of missing a projected telephonic conversation.

It is clear that the conducting wire of a telephone can be used to sound a bell as an alarum by means of a current from a galvanic battery, and thereby the defect referred to would be supplied. But the necessary apparatus would considerably raise the price of fitting up a telephone apparatus, and besides, one most important property of the telephone, viz., producing the required electric current automatically, would be partly lost. I have, then, invented another warning apparatus, which, I believe, is quite workable.

Hitherto telephones have been so constructed that only one pole (N in the figure) of the magnet is effective; I now use also the second pole S, by providing it with a coil of wire, which is simply inserted in the circuit behind the first coil. (The dotted lines in the figure will explain this connection; the two ends α and β are connected with the binding screws fastened to the telephone; from this the circuit goes to the second telephone.) Before this pole of the magnet may be very easily set up a tuning-fork, A, which, with the telephone, is simply fixed on a resonance case, B; this arrangement should be made both at the transmitting and receiving stations, and both forks should be in unison. If now the sending station wish to signal that a conversation is to be begun, the fork of that place will be sounded with a fiddle-bow; the currents thereby induced in the coil are powerful enough to set the fork of the receiving station in such intense vibration that the sound may be distinctly heard in a large room; warned by this signal a person can in the usual way put the telephone to his ear and listen to the words from the transmitting station. And so *vice versâ*.

I have made an experiment in a large room, when about 100 people were present, and all could hear the sounds of the fork, which in the manner described was set in vibration by a second fork in a distant room. The two forks were König Ut_4; lower forks give less clearly heard tones; with higher forks I was unable to make any experiment, since I had not two similar ones at my disposal.

Let me mention two other experiments which I have made. The first is of importance in connection with the question as to how the clang-tints of tones are reproduced through the telephone. In one of the two telephones described substitute for the Ut_4 fork a higher one, and sound this by means of a fiddle-bow, and there will be heard with another inserted telephone of the ordinary construction tones of even 12,000 double vibrations per second, a sign that the variations of the magnetic condition of a magnet perceptibly occur, even when the forces producing these variations change their size 24,000 times in



a second. This result moreover was not to be expected, since, as is known, magnetic polarisation requires time to accomplish. Whether these higher tones are comparatively weaker than the deeper cannot be determined, but probably this is the case.

In another experiment I used the telephone to test the electric vibrations indicated by Helmholtz and others, which are produced by the opening of the primary current of an induction apparatus in the induced coil, when the ends of the latter are connected with the armatures of a condenser. For this purpose I inserted the telephone in the circuit between coil and condenser, and observed the effect when the current in the inducing spiral was opened.

When the ends of the induced spiral were not connected with the condenser, I heard a dull report in the telephone; when, again, these ends were connected with the condenser, this report was accompanied by a shorter, higher sound, whose vibration-number might perhaps be determined by a musical ear; a proof of the existence of the vibrations mentioned in the last case. The observations were made with a telephone, the iron membrane of which was very thin and had a very deep tone.

W. C. RÖNTGEN