15 m. to 45 m. *after* sunset, and in most cases in a cloudless sky; but that on 1886 June 5 was the reverse in both points. Some notes will be found in NATURE, 1883, April and May, for the pillar observed in that year. That seen here partly resembles Fig. 4, Plate III. in *Symons's Meteorological Magazine*, 1871.

F. A. BELLAMY

Radcliffe Observatory, Oxford, June 21

The Enemies of the Frog

WHEN living at Mackay, Queensland, I frequently observed that the common house-frogs (*H. cærulea*) were injured in the hind-limbs, and on several occasions I would hear them croaking in pain; but on arrival all I saw would be a wretched exhausted frog weakly hopping away with a wound in the hind-leg, from which the blood would be oozing. Later on I found that rats attack the frogs. The rats catch the frog by the hind-leg, and apparently suck the wound they cause, then let the frog crawl away, attack it and suck it again, and so on until the rat has had enough. I believe the rats suck the blood, because I was never able to discover a frog so attacked on which the flesh had been destroyed.

Mr. W. P. Fletcher, a well-known local naturalist, once gave me the following account of a mantis attacking a frog. It was in the autumn of 1877, at Rockhampton, Queensland. He was "attracted by hearing the noise of a frog in distress, in the daytime, in some garden-shrubs about 6 feet high; he went to see the cause, and found a green frog about 2 inches long. A green mantis about 5 inches long, with one claw had hold of it across the neck, so that the frog could not move, and the mantis was chewing, and did chew off, the hind-leg, the blood flowing profusely." He called Mrs. Fletcher to see them, and then destroyed the mantis, whereon the frog crawled away.

At Lake Elphinstone (100 miles from Mackay) I once found a small frog (*H. rubella*) in the house in a very exhausted condition; on examination I found a large leech on its tongue. This specimen, with the leech attached, I gave to Mr. Boulenger at the British Museum, where it can be seen.

At Mackay the chief enemies of the frogs appeared to be the snakes and the *Agamidæ*.

H. LING ROTH

Chronology of Elasticians

IN forming a chronological list of writers on elasticity I have been unable to ascertain the following dates, which I should be much obliged if any of your readers would kindly supply: Mariotte (*né près de Dijon vers* 1620, Marie). Is nothing more definite known as to the date of his birth?

F. E. Neumann	Death years.
W. Weber	
Eaton Hodgkinson	
S. Haughton	Birth years.
J. H. Jellett	

University College, London, June 27

KARL PEARSON

SOLAR METEOROLOGY[1]

SIG. TACCHINI'S detailed report on the various phases of solar activity during the year 1884 deserves, as might be expected from the reputation of its author, most careful attention. Exceptionally fine weather permitted observations of sunspots and faculæ to be made at the Collegio Romano on 307 out of the 365 days, so that the materials accumulated were more than usually abundant. We are thus particularly well informed regarding the symptoms attending the protracted maximum which culminated in February 1884.

This is the more fortunate as that maximum was distinguished by features of special interest. It was delayed considerably beyond the usual term, the interval from the maximum of 1870 being no less than 13·4 in lieu of the normal 11·1 years. And to this delay corresponded a greatly reduced intensity, in accordance with the law by which the undulations of the curve representing spot-frequency are low in proportion as they are long. The maximum of 1884, accordingly, was by much the feeblest which had occurred since 1830. It was moreover a hesitating—it might almost be called an abortive—maximum. Some unknown cause apparently interfered with its due and punctual development. Partial anticipatory outbreaks betrayed the tendency, continually repressed, to complete the cycle at the regular epoch, and with the regular expenditure of energy. Now perturbation—of whatever nature—is always instructive: hence Signor Tacchini's laborious statistical results acquire added significance.

They have been gathered along several closely connected lines of research. The various classes of solar surface-phenomena—spots, faculæ, prominences, metallic eruptions—have been studied apart, and the several resulting inferences as to the progress of solar disturbance subsequently confronted. The trifling discrepancies thus revealed show the mutual dependence of no two such species of commotion to be absolute. Each swells or subsides on the whole without immediate or invariable reference to any other, although under the obvious control of some common underlying cause.

Sunspot activity received a notable accession in the beginning of October 1883, the phase of excitement reaching its acme in the following February,[1] and persisting until the end of May. Since then, some slight oscillations notwithstanding, it has continually declined. The sun was not, however, observed at Rome to be free from spots on a single day in 1884. The maximum for prominences occured in March, and they continued exceptionally numerous down to the end of October. In all, 2714 were delineated and described in 242 observations with the spectroscope, being at the average rate of 11·22 per diem. Sixty metallic eruptions, observed on the same occasions, gave a mean diurnal frequency of 0·248 as against 0·171 for 1883. The richest crop was collected in November 1884, during which month ten eruptions were recorded in sixteen observations. The development of faculæ deviated so markedly from that of spots that their respective fluctuations were at times even inverted. It should also be noted that the mean area per spot in 1884 was of little more than half its value in the preceding year, and that the magnetic instruments at Rome remained throughout comparatively calm

Much valuable information is afforded by Signor Tacchini's careful inquiries as to the distribution on the sun's surface of the different orders of solar phenomena. All these showed, during 1884, a conspicuous prevalence of activity in the southern hemisphere; and the inequality—as appears from a note by the same author presented to the Reale Accademia dei Lincei, March 7, 1886—became still more striking in the ensuing year. No spot was observed in either hemisphere during 1884 at more than 30° from the equator; nor on the northern side, during the latter half of the year, at above 20°. With this contraction of the spotted zone coincided a close approach to the equator of the parallel of maximum frequency; and the usual equatorial minimum was both in 1884 and 1885 very imperfectly maintained.

Prominences were plentifully distributed between 60° north and 50° south latitude, with maxima between 20° and 30°. As during the spot-maximum of 1870, they showed no disposition to avoid the vicinity of the equator; while in 1880, 1881, and 1882, the equatorial minimum of prominences was very marked, and remained perceptible in 1883. Although some rare instances of metallic eruptions were detected in high northern latitudes, they affected chiefly a zone bounded by parallels of 20°. Faculæ occurred predominantly in the same region, and nowhere appeared in latitudes above 50°. On the whole, a concentration towards the equator of the whole range of phenomena was unmistakable, and might be thought to

[1] "Meteorologia Solare." Note di P. Tacchini. Estratto dagli *Annali della Meteorologia Italiana*, Parte 3, 1884. (Roma: Tipografia Metastasio, 1885.)

[1] M. Rudolf Wolf places the maximum in November 1883.